Telephony.

THE AMERICAN TELEPHONE JOURNAL

PUBLISHED EVERY SATURDAY
TELEPHONY PUBLISHING COMPANY
VOL. 74 NO. 11

CHICAGO, MARCH 16, 1918.

SINGLE COPIES, 10 CENTS
YEARLY, U. S. A., $3; CANADA, $4
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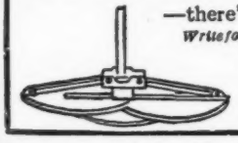

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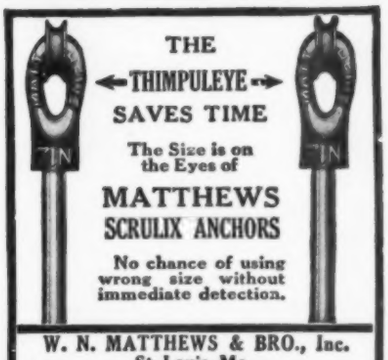

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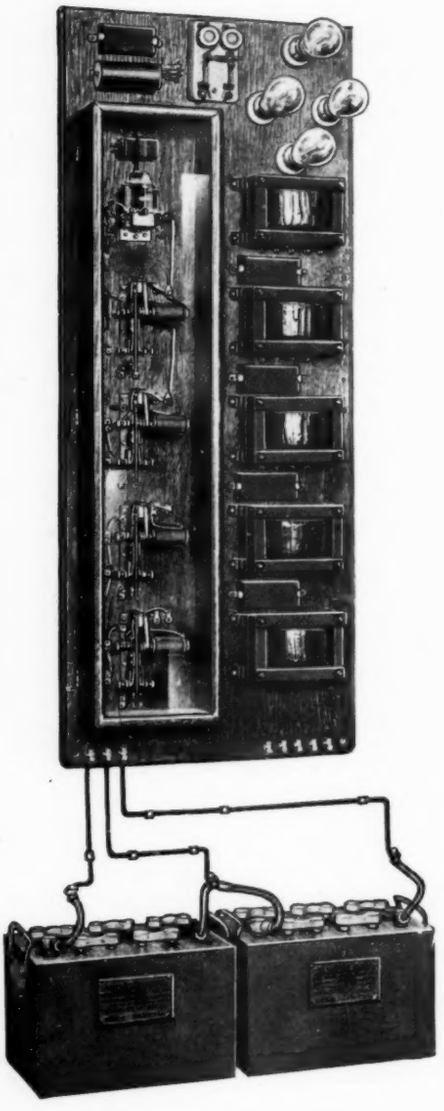

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Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone, Sound Waves.

PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY
MONADNOCK BLOCK, CHICAGO

J. C. KELSEY, PRESIDENT AND EDITOR.
S. R. EDWARDS, MANAGING EDITOR.
H. D. FARGO, SECRETARY AND TREASURER.
J. R. HASTIE, VICE-PRESIDENT AND ADVERTISING MANAGER.

Entered as second-class matter September 4, 1908, at the post office at Chicago, Ill., under act of March 3, 1879.

Volume 74
Number 11

CHICAGO, SATURDAY, MARCH 16, 1918

Subscription—10 Cents a Copy
$3 a Year U. S., Cuba and Mexico
$4 Canada, $5 Other Countries

By the Way—

The third Liberty Loan goes "over the top" on April 6.

Telephone managers are taking active part in preparations to put this loan over. Everyone is expected to contribute to its success. Plan accordingly.

Profiting from Experience.

Telephone men are becoming accustomed to making up reports of all kinds. These involve figures which have to be taken from the company's records. The reports must be made and some of them are quite specific in the information required, and it is becoming more specific each year. The income tax reports have set many persons to keeping personal accounts who have never kept such records before.

To properly compile these reports, data is required which must be accurate, so that the keeping of books is most essential. But the company's books should be used for other purposes than for the compiling of these numerous reports. Many companies seem to think that is their only use. When analyzed carefully, figures present valuable information for guidance in the conduct of business.

The business man is learning the value of cost accounting. He has found out that he must know his costs in order to continue in business—and telephone companies are having the same fact forced upon them. State utility commissions are telling many telephone companies:

"Your records are not sufficient for us to determine anything about your financial condition—whether or not you need an increase in revenues. When you have your accounts in such shape that they will tell us definitely about your operating costs, come to us. In the meantime we cannot grant the rate increase asked for, as we have no information on which to base any such an order."

Experience is a hard but most thorough instructor, but many people profit from the experiences of others. Do you?

The Telephone and the War.

The National Security League has offered a prize of $1,000 for the best suggestion as to the most effective method of getting America's war aims before the German people. This is based, of course, on the hope that if they knew those aims the German people would compel their government war maniacs to stop the war.

Whether they would or not is beside the question we have in mind. The best opinion today is that the German people are supporting their government fully and that the only way to end the war is to beat Germany decisively and convince both government and people that they have no heaven-sent right to rule the world.

But, supposing Germany were a different sort of a country and that its telephone system were independent of the government. Supposing, also, that the real lovers of liberty there organized to make a "Stop-theWar" campaign by telephone. What would be the result if day after day the telephone were used to spread thousands of forceful messages throughout the length and breadth of the country?

Americans well know what effective work is done over telephone wires in organizing and pushing public effort along many lines.

With a government-owned telephone system such propaganda is, of course, impossible. The citizens' committee that used the telephone over there to stir up interest in any movement not favored by the government, would soon be behind the bars of the nearest jail. Have the American advocates of government ownership of the telephone thought of this angle of the matter?

Needless to say, no treasonable communications should pass over the telephone wires or in any other way. The fact remains, however, that absolute control of the telephone helps an autocratic government to fortify itself.

In the good old United States, we are proud to say the telephone industry has proved its willingness to devote every man, every dollar, and every ounce of material and equipment to the cause of our government. Whether owned by the government or by individual enterprise, the telephone business of this country stands for Uncle Sam, first, last and all the time.

The Figuring of the Power Plant

Data Which the Power Plant Engineer Requires for the Determination of the Power Plant for Common Battery Exchanges—Use of This Traffic Data in Practical Illustrations—Provisions for Future Exchange Growth

By P. A. Price

"How much battery will we need?"

To the manager of a small exchange who proposes to build a larger office, or to change from a magneto to a common battery basis this question is often perplexing. But the answer is not very difficult of determination.

	1917.	1922.	1927.	1932.
Lines	600	850	1,050	1,200
Stations	900	1,125	1,425	1,620
Subscribers' calls per day ...	5,400	6,750	8,550	9,720
Toll switches per day ...	180	270	360	420
P. B. X. calls, local.....	150	200	250	300
P. B. X. calls, in.....				
P. B. X. calls, out				

Note: This table does not necessarily represent the growth or any other factor obtaining in an exchange of 600 lines, but it does represent these factors as they might be found in some particular exchange of that size and should be so understood.

Table 1. Traffic and Commercial Data.

For the purposes of this article it is assumed that the manager has seen to it that peg counts have been made at regular intervals, and that the gradual increase in the general business of the exchange has been checked and studied to the extent of knowing what proportionate increases in the various classes of service may be looked forward to.

If the increase in the number of lines and stations has been regular for the past few years, it may be assumed that the future will hold proportionate increases. If the peg counts of the same period show an increasing number of daily calls, a basis for computing the daily calls of future periods may be ascertained. A little figuring will readily show the intimate relationship between the number of calls and the number of stations. The number of toll switches is also susceptible to a similar study of relationship.

There is a value in obtaining this data other than for power plant computation. If it takes so many operators to handle so many daily calls of various kinds, any increase in the number of calls will mean an increase in the number of operators. And if the data indicates that there will be 300 more lines in the next three years, it will mean that more switchboard equipment, cross-connecting frames, relay racks, etc., will be required to accommodate these lines, and that floor space must be available for the location of this equipment.

If a building is under contemplation as a new home for the exchange, or the renting of new quarters is under consideration, it would be extremely bad policy to "take a chance" on having adequate floor space without a very careful consideration of all the factors that bear upon the growth and expansion of the exchange. While a building may be added to—sometimes—rented quarters are not always so adaptable to unexpected needs. And adding to a building is an expensive proposition. It is better to anticipate the requirements and provide floor space for the growth of eight or ten years than to put on additions and extensions as the immediate need arises.

This article, however, is not concerned with building plans except as they are affected by the power plant—but we are interested in the data that has been gathered and from which the plans for the building take shape. We want to know the number of lines, the number of daily calls of various classes, and the number of private branch exchange calls, not only of today, but of the future. And we also want to know for what periods these futures are indicated—whether for five, or eight, or ten years.

The power plant is the heart of the exchange, and it's a big, bulky heart that will not permit of frequent relocation. It should "stay put," and we want to see that it will have room to expand without encroaching or being encroached upon by other equipment.

With this in mind we select certain items from the traffic and commercial data, and tabulate them as shown in Table I. In this table it is seen that at the present time we have a certain number of lines and stations. There is also a certain number of daily calls of various kinds. These calls bear a more or less definite relationship to the number of stations from which they originate, and if this relationship is definite now, it should be definite for future periods as well. With the ratio between the two factors determined for the present period, it may be determined for any future period of which one of the factors is known.

Of course, something may come up in the future which will increase the number of stations beyond expectations, and in consequence the number of calls per day will increase in a proportionate manner. The unexpected cannot be anticipated, although allowance may be made for it as we shall see later on.

The item of "private branch exchange calls" in the table may be worth a moment's consideration. These calls are made up of three classes: Inter-station or local calls, calls to central office subscribers, and calls from central office subscribers. The last two classes are made over trunk lines and will nearly always bear a certain relationship to each other and to the number of trunks.

Though these exchanges may have storage batteries of their own, the chances are that these batteries will be charged by the regular central office battery over a charging circuit, so any current they may use is ultimately supplied from the central office, and will have to be provided for. And the trunk line calls will use current directly from the central battery as well as from that of the private exchange supply.

From the foregoing it is evident that in Table I we have a very fair idea of conditions as they are and as they will be for some time in the future; the number of calls of various kinds that are to be handled, and for which we must supply "battery."

Storage batteries are figured in "ampere-hours," i. e., the elements of the cells, when properly charged will give out so many amperes for so many hours.

In figuring the power plant, it is our business to see that we have elements of adequate size to provide for the present ampere-hour requirements of the exchange; that the tanks or jars are large enough to admit of elements being added as required and to know what these requirements will be; that our charging equipment is of proper size for present and future purposes; whether we shall install a rectifier, motor-generator, or engine-driven set, and if it will prove advisable to install a battery of sufficient size to "carry" the exchange for a period in excess of the day-to-day consumption of current. Last, but not least we must see that we have adequate floor space for our power plant, present and future.

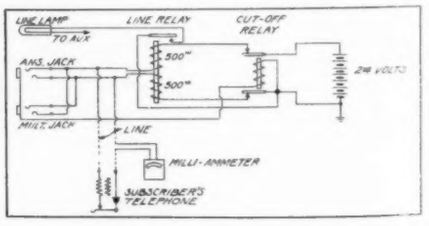


Fig. 1. Circuit for Measuring Current Flow.

Every operation of every circuit of the

switchboard and associated equipment in which there is a flow of electric current from the storage battery means the consumption of a certain amount of electricity to the extent of the current requirements of the operation, and for the time-period of the operation. It is simply a case of Ohm's Law ($C = E/R$) with a time factor added.

To minimize this consumption of current, a well-designed switchboard will have circuits which permit of just enough current being used to insure good transmission and clear, positive signals and supervision.

An excessive economy would be as unsatisfactory as the other extreme. The voltage requirements of a certain type of switchboard may be 24, 36, 40 or 48 volts, but in each case the equipment is designed to operate with a minimum battery consumption at that particular voltage. A relay designed for operation on a 24-volt circuit would become heated in a circuit using 48 volts, for the lower resistance of the winding would permit of twice the amount of current flow at this double voltage.

What the current consumption of a particular circuit may be will depend upon the resistance of the circuit. This may be determined by a study of the equipment: This relay has such a resistance, this lamp so much, this shunt affects the relay or lamp so much—rather a difficult and involved subject of study without proper apparatus and conditions for investigation. Manufacturers may supply this data upon request, but it might not be in such form as to be usable for the calculations we have in mind.

If a milliammeter be placed in series with an operating circuit, say a subscriber's line circuit as in Fig. 1, it is obvious that the flow of current may be measured and used as a basis of power computations.

We will say that the reading obtained is 0.025 ampere. This is small, because the 1,000-ohm resistance of the line relay does not permit a great amount of current to pass at 24 volts. But the relay is so designed that it operates with this small amount of current and brings in a signal, and that is all that is required. The line resistance and that of the telephone instrument were not considered in this example, and would tend to a further reduction of the current flow.

In Fig. 2 the measurement of the line circuit is repeated after an operator's cord has been connected with the line jack. The sleeve of the cord circuit has operated the cut-off relay of the line circuit, and the current does not flow through the line relay but through the low resistance of the repeating coil and supervisory relay, and thence to the line and measuring instrument. The reading in milliamperes will be higher than before on account of the much lower resistance of the circuit. This was so designed that the transmitter of the subscriber's instrument might have the proper amount of current requisite for good transmission.

From these examples an idea of how to obtain the current requirements of various circuits is indicated, and a few hours of interesting work with a milliammeter will provide a fund of valuable data.

In Table II is shown what may be found by such analysis of a subscriber's call; wherein a party has placed a call, the called party has answered, a conversation has been carried on, and both parties have hung up. In this analysis the important "time-factor" has been considered, for it is by considering a certain amount of current consumption for a certain definite period of time that we determine the size of the battery which will be required.

Circuit.	Operation.	Current Flow.		Time Factor.	Ampere-Seconds.
Line signal	Awaiting operator	0.025	×	6 seconds	0.15
Line auxiliary signal	Awaiting operator	0.15	×	6 seconds	0.9
(Operator answers.)					
Ans. cord (talking)	Giving number and awaiting party	0.15	×	30 seconds	4.5
Ans. cord (supervisory)	Held clear	0.015	×	30 seconds	0.45
Call. cord (supervisory)	Operative until party answers	0.15	×	30 seconds	4.5
(Called party answers.)					
Both cords (talking)	Conversation on both cords; each 0.15 ampere	0.30	×	90 seconds	27.0
Both cords (supervisory)	Held clear until completion of call; each cord 0.015 amp.	0.03	×	90 seconds	2.7
(Conversation is completed.)					
Both cords (supervisory)	Operative until connection is taken down; each cord 0.15 ampere	0.3	×	6 seconds	1.8
Operator's telephone	Asking and repeating desired number	0.2	×	6 seconds	1.2
Total ampere-seconds					43.2

43.2 ampere-seconds divided by 60 equals 0.72 ampere-minute per call.

0.72 ampere-minute loaded 30 per cent to cover the class of calls for which battery consumption must be allowed: (Don't answer calls; Wrong number calls; Line busy calls; Information calls; Supervisor calls; Miscellaneous calls) = 0.936 ampere-minute

Note: The time factor involved in these "bad" or uncompleted calls will account for the loading percentage.

Table 2. Tabulation of Results of Analysis of Subscriber's Call.

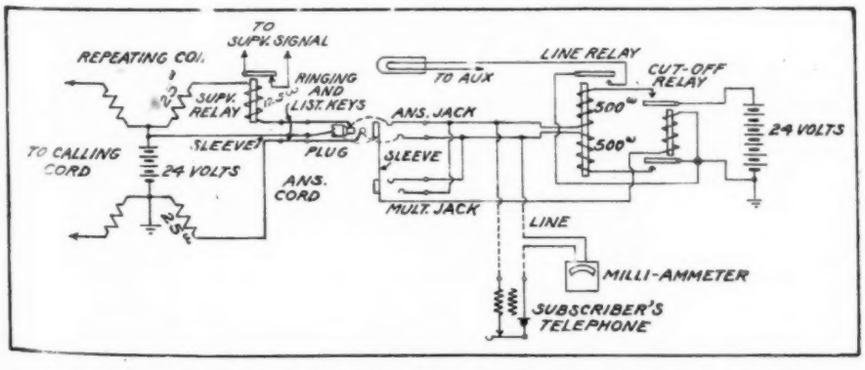


Fig. 2. Measurement of Line Circuit With Operator's Cord Circuit Connected.

In the analyzed call we found that current consumption to be equivalent to 43.2 ampere-seconds, or 0.72 ampere-minute. But this was an ideal connection—the operator answered promptly, the called subscriber answered promptly, the conversation lasted but a short time, and the connection was taken down within a very reasonable length of time. It is too idealistic, in fact, to be a matter of common occurrence. So, as the good must always suffer with the bad when in their company, the call we have analyzed must be made to bear a share of the current consumption occasioned by calls that are not so perfect, and again for calls that have an undue time factor through no fault of their own.

We will say that out of 100 calls, 70 are completed without trouble and with no delays. The remaining 30 calls are not necessarily all of the uncompleted kind, but include calls for information, for the time, for complaints, etc.

If the daily peg count considers completed connections between subscribers only, it is evident that if we did not make an allowance for the kind of calls enumerated, we would have a current consumption going on every day for which there was no accounting. And a battery computed on the basis of perfect connections only, would be supplying current for these extra calls without being of adequate capacity to provide for them.

To include the consumption of current from this source, we can either make a separate specific allowance for it or, easier still, add it to the consumption of the

perfect calls. Our perfect connection having a current consumption of 0.72 ampere-minute, by adding 30 per cent of this amount we will obtain a factor which should be safe to use to cover the average current consumption of subscriber's calls.

In Table III is shown the current consumption of the various classes of calls as they are worked into ampere-hours in the power computations. It should be understood that the various rates of consumption are purely empirical. They do not represent the actual conditions of any particular type of switchboard, but approximate what might be developed from an analysis of the current consumption of various circuits of a 24-volt switchboard.

The result of multiplying the total number of calls of a certain class by the current consumption of an individual call, will give the total consumption of that class of call in ampere-minutes, and dividing by 60 will give the consumption in ampere-hours—the basis upon which the storage battery is figured.

In approximating the consumption of current for toll switches, the idea of a separate toll board was in mind and will explain why this figure may be considered high. When toll positions are included in the line-up of the subscriber's switchboard, a lower current consumption will be found, because a certain amount of trunking will be eliminated.

Down the column is found the item of "Aerial Distribution Loss." No matter how carefully lines are built, there is certain to be a loss of current—very small in the individual case but with a total worthy of consideration in a large exchange. As this loss is constant through the 24 hours of the day, we may take a 24-hour factor to express it, and multiply this figure by the total number of lines which contribute thereto.

With this included, we find the total daily consumption to be 103 ampere-hours. But if we let this stand as an exact total, we might we skating on thin ice; at best we would not be allowing for any possibility of underestimated growth. To be on the safe side it will be advisable to add a certain percentage of the total, say 25 per cent, which in this case amounts to about 26 ampere-hours.

The next item, "Current Consumption of Ringing Machine," may need a word of explanation. In offices where there are conditions proving adverse to the use of pole changers, small motor-generators, or motor-driven ringing machines are employed for the generation of ringing current and, as a safety factor, it is, of course, advisable to have an emergency machine in case one or the other gets out of order.

One of these machines may be driven by electric power from the city lighting circuit, and the other operated from the central office battery. It is this battery-

Requirements for 1917:

Daily total subscribers' calls	5,400 x 0.936	÷ 60 =	84	ampere-hours.
Daily total toll switches	180 x 2.0	÷ 60 =	6	ampere-hours.
Daily total P. B. X. calls	150 x 0.3	÷ 60 =	1	ampere-hour.
Aerial distribution loss, 600 lines	x 0.02 per line		12	ampere-hours.
Total			103	ampere-hours.
25 per cent of total added for safety factor			26	ampere-hours.
Consumption of ringing machine			75	ampere-hours.
Total consumption for 24 hours			204	ampere-hours.

Storage battery required: 30 amperes for 8 hours = 240 ampere-hours.

Capacity of charging set $\frac{204 \text{ plus } 25 \text{ per cent}}{10} = \frac{255}{10} = 25$ amperes.

For 48-hour supply:

204 x 2 = 408 ampere-hours.

Storage battery required: 60 amperes for 8 hours = 480 ampere-hours.

Capacity of charging set $\frac{408 \text{ plus } 25 \text{ per cent}}{10} = \frac{510}{10} = 51$ amperes.

For 72-hour supply:

204 x 3 = 612 ampere-hours.

Storage battery required: 80 amperes for 8 hours = 640 ampere-hours.

Capacity of charging set $\frac{612 \text{ plus } 25 \text{ per cent}}{10} = \frac{765}{10} = 76$ amperes.

Requirements for 1922:

Daily total subscribers' calls	6,750 x 0.936	÷ 60 =	105	ampere-hours.
Daily total toll switches	270 x 2.0	÷ 60 =	.9	ampere-hours.
Daily total P. B. X. calls	200 x 0.3	÷ 60 =	1	ampere-hour.
Aerial distribution loss, 850 lines	x 0.02 per line		17	ampere-hours.
Total			132	ampere-hours.
25 per cent of total added for safety factor			33	ampere-hours.
Consumption of ringing machine			75	ampere-hours.
Total consumption for 24 hours			240	ampere-hours.

Storage battery required: 25 amperes for 8 hours = 280 ampere-hours.

Capacity of charging set $\frac{240 \text{ plus } 25 \text{ per cent}}{10} = \frac{300}{10} = 30$ amperes.

For 48-hour supply:

240 x 2 = 480 ampere-hours.

Storage battery required: 60 amperes for 8 hours = 480 ampere-hours.

Capacity of charging set $\frac{480 \text{ plus } 25 \text{ per cent}}{10} = \frac{600}{10} = 60$ amperes.

For 72-hour supply:

240 x 3 = 720 ampere-hours.

Storage battery required: 90 amperes for 8 hours = 720 ampere-hours.

Capacity of charging set $\frac{720 \text{ plus } 25 \text{ per cent}}{10} = \frac{900}{10} = 90$ amperes.

Requirements for 1927:

Daily total subscribers' calls	8,550 x 0.936	÷ 60 =	133	ampere-hours.
Daily total toll switches	360 x 2.0	÷ 60 =	12	ampere-hours.
Daily total P. B. X. calls	250 x 0.3	÷ 60 =	2	ampere-hours.
Aerial distribution loss, 1,050 lines	x 0.02 per line	=	21	ampere-hours.
Total			168	ampere-hours.
25 per cent of total added for safety factor			42	ampere-hours.
Consumption of ringing machine			75	ampere-hours.
Total consumption for 24 hours			285	ampere-hours.

Storage battery required: 40 amperes for 8 hours = 320 ampere-hours.

Capacity of charging set $\frac{285 \text{ plus } 25 \text{ per cent}}{10} = \frac{356}{10} = 35$ amperes.

For 48-hour supply:

285 x 2 = 570 ampere-hours.

Storage battery required: 80 amperes for 8 hours = 640 ampere-hours.

Capacity of charging set $\frac{570 \text{ plus } 25 \text{ per cent}}{10} = \frac{712}{10} = 71$ amperes.

For 72-hour supply:

285 x 3 = 855 ampere-hours.

Storage battery required: 110 amperes for 8 hours = 880 ampere-hours.

Capacity of charging set $\frac{855 \text{ plus } 25 \text{ per cent}}{10} = \frac{1,068}{10} = 106$ amperes.

Requirements for 1932:

Daily total subscribers' calls	9,720 x 0.936	÷ 60 =	152	ampere-hours.
Daily total toll switches	420 x 2.0	÷ 60 =	14	ampere-hours.
Daily total P. B. X. calls	300 x 0.3	÷ 60 =	2	ampere-hours.
Aerial distribution loss, 1,220 lines	x 0.02 per line	=	24	ampere-hours.
Total			192	ampere-hours.
25 per cent of total added for safety factor			48	ampere-hours.
Consumption of ringing machine			75	ampere-hours.
Total consumption for 24 hours			315	ampere-hours.

Storage battery required: 50 amperes for 8 hours = 400 ampere-hours.

Capacity of charging set $\frac{315 \text{ plus } 25 \text{ per cent}}{10} = \frac{393}{10} = 39$ amperes.

For 48-hour supply:

315 x 2 = 630 ampere-hours.

Storage battery required: 80 amperes for 8 hours = 640 ampere-hours.

Capacity of charging set $\frac{630 \text{ plus } 25 \text{ per cent}}{10} = \frac{782}{10} = 78$ amperes.

For 72-hour supply:

315 x 3 = 945 ampere-hours.

Storage battery required: 120 amperes for 8 hours = 960 ampere-hours.

Capacity of charging set $\frac{945 \text{ plus } 25 \text{ per cent}}{10} = \frac{1,181}{10} = 118$ amperes.

Table 3. Current Consumption of Various Classes of Calls With Computations.

driven machine that we are considering in allowing current consumption, and a machine of such type is not a very economical source of ringing current, as the allowance will show. If pole changers are employed, this factor will not have to be considered, for even if operated from the central office battery, their current consumption is almost negligible.

In making up such computations, decimal fractions of an ampere-hour may be omitted, or given the value of the next highest digit. Their inclusion in the totals serves no particular purpose and only complicates the figures.

In an exchange district where there are other offices with a system of trunks between them, there are other factors to be considered—the current consumption of these trunks, both out-going and incoming. And if the exchange operates telegraph circuits in any great number, it would be well to consider the current consumption of these loops if they are operated from the central office battery, and the battery requirements of any motor-generator or motor-driven machine that may be used to supply line voltage.

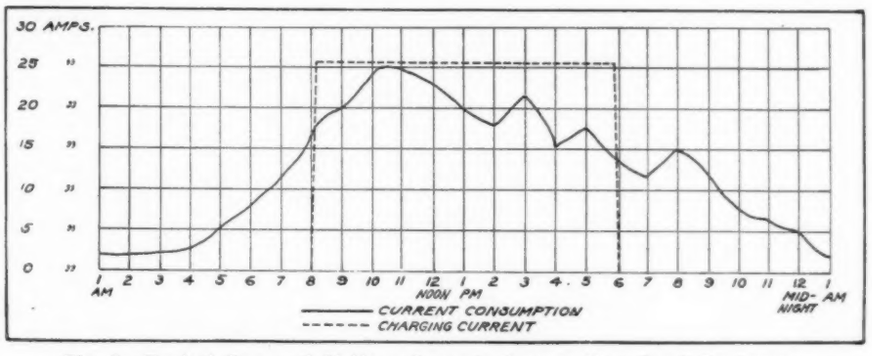


Fig. 3. Typical Curve of 24-Hour Current Consumption, Small Exchange.

In the case of these particular computations, we have included all the items that are a factor in the current requirements of the office and find the daily current consumption to be equivalent to 204 ampere-hours for 1917, the initial power plant. Checking this requirement against the data of a storage battery catalog, we find a certain type of battery will give an output of 30 amperes per hour on an eight-hour discharge, or 240 ampere hours.

As the bulk of the current consumption of a telephone office will be made in eight hours of the day, and as $8 \times 30 = 240$, it will be proper to use this type of battery. This is, of course, more than we actually require, but not to any great extent, and the next size smaller will only give us an eight-hour discharge of 200 ampere-hours, which is not enough according to our computations.

We find from the battery catalog that such a battery requires a charging rate of 30 amperes, but let us look into this matter to some extent. Why do we use a storage battery? Why could we not operate our switchboard directly from a dynamo designed to give the required voltage and current output, and with provision for keeping down "machine noise"? We could, if it would be economical. And why is it not economical? In the answer to this question we find the gist of the power plant.

By referring to Fig. 3, we find a typical curve of the 24-hour current consumption of a small exchange, from 1 a. m. of one day until 1 a. m. of the next. The vertical lines represent the hours of the period; the horizontal lines represent amperes, and the solid line, which crosses the two, represents the current consumption as it rises and falls during the day.

Starting at the left of the sheet at 1 a. m., the current line does not rise above five amperes until after 5 a. m., and then rises slowly until 8 a. m. From that time it rises sharply until the busy hour peak of the day, say at 10:30 a. m., when it shows there is a maximum consumption of current from the battery. It remains stationary at this point for perhaps an hour, and then commences to drop slowly until after the noon hour, when it rises again to some extent, and remains fairly constant for a few hours. At 4 p. m. it has dropped, but remains on this new level until about 6 p. m., when it decreases sharply and then gradually tapers off until 1 a. m. of the following day.

If we obtained the current for switchboard operation directly from a dynamo, we would have to exercise a constant supervision over the machine for 24 hours of the day, or else run the dynamo at full capacity for that length of time. As constant supervision would accomplish nothing in the conservation of power used to operate the dynamo, it would be as useless and expensive as operating the machine for this period. But if we provide some method by which we can store up current to be used when it is not economical to take it directly from the dynamo, we have done something which is economical.

Referring again to Fig. 3 it will be noted that at 8 a. m. a dotted line rises from the line of O amperes, and ascends to the 25-ampere horizontal, where it remains until 6 p. m., or for 10 hours. This is the charging current. At 8 a. m. we start our charging machine, with its output of 25 amperes, and it proceeds to charge the battery and operate the switchboard at the same time. At 8 a. m. the switchboard is using but 15 amperes. The dynamo supplies this and an additional 10 amperes for the cells.

At the busy hour period the dynamo is giving all its output to the switchboard; the battery is getting none at all—it is resting. But the busy hour period does not last for long and, as the consumption of current for operating the exchange decreases, the dynamo is again able to put some current into the cells in addition to taking care of the switchboard. What is the result?

The battery has had nothing to do for ten hours of the day. The dynamo has supplied the current for the switchboard, and when the current requirement of the switchboard was less than the output of the dynamo, the battery received this difference as charging current. As this condition obtained for about eight hours of the charging period, the battery received enough current to carry the light load of the remaining hours of the day, and up to the time when the dynamo helped out the next day.

To make sure, however, that the battery will receive enough current to keep it in shape and that there is no excess rate of discharge over charge, once a week the dynamo is kept running for from four to six hours extra and the battery is given what is called "an overcharge." This is not done, however, unless the specific gravity readings indicate its necessity.

If we wish to figure the required charging rate of the battery on this basis—and it is the logical one—we will accordingly divide the amount of current consumption of 24 hours (or of 48 or 72 hours) by the number of hours that we intend to charge each day—8 or 10 as the case may be—and the result will be the required charging rate for the battery. To provide an additional margin of safety for this charging rate, we may add 20 or 25 per cent of the daily consumption, and then make our division.

In this case we have added this margin and have considered that a 10-hour charging period will be satisfactory. The result shows that 25 amperes will be required. As a motor-generator or engine-driven machine of such small capacity is not a very efficient source of current, it would apparently be best to use a mercury-arc rectifier of 25 or 30 amperes' capacity.

But in the table we find computations for 48 and 72-hour current supply. This brings up another question, and one well worth consideration. With one battery and one source of power for charging it, we are apt to be up against an awkward proposition in case anything should hap-

(*Continued on page* 41.)

Great Expansion of Bell Property

Annual Report of Bell System Shows Increase of Equipment and a New Toll Traffic Record Due to War Conditions—Earnings Are 8.83 Per Cent as Compared with 9.61 Per Cent in 1916 Despite Increased Revenue

The annual report of the Bell system, which comprises the American Telephone & Telegraph Co. and associated and connecting companies, is characterized by Theodore N. Vail, the president, as "one of the most interesting documents ever issued by the company," because "the telephone has come to be a vitally important factor in all defensive operations." The report covers the year ending December 31, 1917, and was made public early this week.

The 1917 net income available for dividends totaled $38,471,106, an increase of $457,829, and was equal to $8.83 a share on the $435,658,724 of capital stock, against $9.61 a share earned in 1916 on $395,635,619 capital stock. Although total operating revenues increased $30,319,670, the surplus for the year decreased $8,226,960, largely as a result of the higher cost of operation.

The traffic last year broke all records, the daily average of toll connections being 1,000,000, and of exchange connections 30,845,000. This means an average of about 100 calls a year for every man, woman and child in the United States.

This greatly increased business necessitated a record expenditure for additions to plant, the amount being $118,000,000, an expenditure nearly 50 per cent larger than the similar outlay for any previous year in the Bell's history. The company had planned to expend only $90,000,000, but the increased cost of labor and materials contributed to increase the investment per station from $146 to $153.

At the end of the year the number of stations in the Bell system was 10,475,678, an increase of 628,486. Of the total stations, 7,031,530 were owned and operated by Bell companies and 3,444,148 by local, co-operative and rural companies or associations having sublicense or connecting contracts.

Work for the Government.

When war was declared the Bell system was ready for the call made on it for extraordinary service by the government, according to Mr. Vail. Work which ordinarily would have taken several months was done in a few weeks, because of elaborate plans worked out in advance.

Referring to government control, Mr. Vail says:

"Whatever can be done by the government through direct operating can be done more certainly through control and regulation of private operation, thus combining the potency of the governing with the initiative and interest of the subject."

The total operating revenues of the Bell system were $294,900,000, an increase of 11½ per cent over 1916. Every item of expense increased so radically, however, that the company's gross income, as defined by the Interstate Commerce Commission, aggregated $76,524,000, a decrease for the year of 3.6 per cent. Out of this income $25,810,000 went for interest, rents, etc., leaving $36,862,000 for dividends and $13,852,000 to be carried into surplus.

Capital stock, bonds and notes payable of the Bell system in the hands of the public of the end of 1917 were represented by $917,376,422, of which the securities of the American Telephone & Telegraph Co. contributed $626,412,025, and securities issued by the associated companies, $290,964,397.

Increase in Assets.

If current accounts payable are considered (which are largely exceeded by cash and quick assets) the entire permanent capital obligations held by the public stand at $885,298,892. Appraisals of properties made by various state authorities for rate-making purposes have been generally in excess of the amounts carried on the books of the various companies. The telephone plants on the books of the companies stand at $1,064,892,710, this showing a net increase of $118,599,462 after deducting all plants withdrawn from service, sold or abandoned. An increase of $77,640,236 in total assets is represented by $36,051,601 gain in outstanding obligations of the whole system and an increase in surplus and reserves of $41,588,635.

The combined surplus and reserves are considerably less than the sum of surplus and reserves shown on the books of the separate companies since all intercompany items and intangible assets are eliminated. The surplus and reserve of $303,500,000 is invested in productive property, the revenue from which, being free from capital charges and subject only to operating costs, reduces the expenses of the service.

The income account and balance sheet as of December 31 of the Bell system in the United States for the last two years compare as follows:

	1917.	1916.
Exchange revenues.	$207,471,937	$188,888,149
Toll revenues	84,559,861	72,971,668
Miscellaneous revs.	2,863,152	2,715,463
Total operating revenues	294,894,950	264,575,280
Depreciation	52,919,458	49,631,966
Current maintenance	41,151,041	34,923,549
Traffic expenses	68,121,646	53,748,707
Commercial expenses	28,364,039	25,698,913
General and miscellaneous expenses.	13,849,960	11,902,470
Total operating expenses	204,406,144	175,905,605
Net operating revenues	90,488,806	88,669,675
Uncollectible revenues	1,229,253	1,480,502
Taxes	20,710,933	14,916,448
Operating income.	68,548,620	72,272,725
Net non-operating revenues	7,975,869	7,080,384
Total gross income.	76,524,489	79,353,109
Rent and miscellaneous deductions	3,990,047	3,735,470
Interest deductions.	21,820,231	18,378,931
Total deductions	25,810,278	22,114,401
Balance net income.	50,714,211	57,238,708
Deduct dividends	36,862,582	35,160,119
Surplus earnings	13,851,629	22,078,589

ASSETS.

	1917.	1916.
Telephone plant.	$1,064,892,710	$ 946,293,248
Supplies, tools, etc.	31,543,745	24,032,099
Receivables	42,472,942	66,029,580
Cash	35,986,840	80,692,829
Stocks and bonds	101,007,231	81,815,476
Total	$1,276,503,468	$1,198,863,232

LIABILITIES.

Capital stock	$ 505,403,777	$ 463,101,569
Funded debts	407,434,080	422,586,617
Bills payable	4,538,565	3,738,451
Accounts payable	46,382,252	38,280,436
Employes' benefit fund	9,219,143	9,151,000
Surplus and revenues	303,525,651	262,005,159
Total	$1,276,503,468	$1,198,863,232

After making proper deductions for the federal income and excess profit taxes, payable this year, the net earnings of the American Telephone & Telegraph Co. for 1917 aggregated $48,940,466. This was $4,197,090 more than the corresponding totals for the previous year. The interest charges were $10,469,360 and the dividends at the rate of 8 per cent annually amounted to $32,481,613.

The company's investments in stocks, bonds and notes of associated companies increased $88,455,220 and permanent plant $12,975,353, while current assets decreased $19,023,302 and cash fell off $42,173,259. There was a total gain in assets of $40,234,012, against which appears a net increase in capitalization and indebtedness of $31,600,897, showing a net improvement in the company's financial position of $8,633,114, which is represented by the increase of that amount in surplus and reserves.

The company had 86,599 shareholders on its books at the close of last year, a gain of 16,044 in the number of shareholders during 1917. The average number of shares held (deducting shares held under the employes' stock purchase plan) was 49. A majority of the company's shareholders are women and less than 2 per cent of its stock is now held by foreign holders. Including the 33,000 employes of the Bell system who are paying for stock on the instalment plan, and

counting also the individuals whose stock is held for them in investment trusts, there are probably 130,000 actual holders of the company's stock at this time.

The income account and balance sheet as of December 31 for the American Telephone & Telegraph Co. for the last two years compare as follows:

Earnings—	1917.	1916.
Dividends	$ 28,894,254	$ 26,710,690
Interest and other revenue from associated companies	17,805,005	14,529,978
Telephone traffic (net)	7,887,547	8,136,314
Other sources	1,650,254	1,555,067
Total	56,237,063	50,932,051
Expenses	7,296,596	6,188,674
Net earnings	48,940,466	44,743,376
Deduct interest	10,469,360	6,730,098
Balance	38,471,106	38,013,277
Deduct dividends	32,481,613	31,122,187
Balance	5,989,492	6,891,090
Carried to reserve	2,500,000	2,500,000
Carried to surplus	3,489,492	4,391,090
Total	5,989,492	6,891,090

ASSETS.

	1917.	1916.
Stocks of associated companies	$489,148,443	$452,390,926
Bonds and notes of associated companies	119,786,058	68,088,355
Telephones	18,088,289	16,779,578
Real estate	509,147	508,400
Office furniture and fixtures	255,231	215,903
Long-lines telephone plant	65,084,543	53,457,978
Employes' stock purchase plan	4,611,478	9,153,950
Special demand notes	20,394,800	21,520,000
Current accounts receivable	19,876,721	15,408,693
Temporary cash investments	2,176,340	20,000,000
Cash and deposits	23,064,401	65,237,661
Total	$762,995,455	$722,761,444

LIABILITIES.

Capital stock	$435,641,200	$395,635,619
Capital stock installments	17,524	.....
Bonded debt	183,184,300	185,002,100
Coupon notes	7,569,000	15,455,000
Div. payable Jan. 15	8,712,824	7,912,072
Interest and taxes accrued	4,084,664	2,783,841
Current accounts payable	3,057,981	2,177,966
Notes payable	.....	1,700,000
Employes' benefit fund	2,000,000	2,000,000
Reserved for depreciation and contingencies	36,354,400	31,092,680
Surplus	82,373,560	79,002,166
Total	$762,995,455	$722,761,444

Note—$21,919,000 coupon notes of associated companies, indorsed but not owned by this company, are not included in either assets or liabilities.

At the close of the year the company had 7,002 employes on leave of absence for military, naval and other government war service. This represented about 9 per cent of the company's male force. For employes thus engaged and their dependents, the companies of the Bell system paid out $612,554.

Recognizing the necessity of telephone service in mobilizing the resources of the nation for the war purposes, officials of the system for more than a year before the entrance of this nation into the war made careful plans to meet war conditions.

With our participation in the war, the government service was immediately given precedence, special operating methods had to be devised, and some 12,000 toll operators had to be trained for this work. In this way the work which would ordinarily take several months was done in a few weeks.

For use in the national service 15,000 miles of toll wire and 27,000 miles of circuit for telegraph use have been withdrawn from commercial service and devoted exclusively to the government. Several of the departmental multiple switchboards in use in Washington are large enough to serve a city of 100,000 population.

Touching its war service, this interesting statement is made.

"In times of peace telephone traffic flows along the channels of commerce. War has made new centers and new routes. Washington has become the center of a vast new traffic. The growth during the last few months in the toll telephone service centering at Washington has been greater than during the eight previous years.

"To meet this increased toll business, new facilities centering at Washington have been provided; the number of lines radiating from Washington has been increased many times, and further increases are still being made. There is also nearly completed between New York and Washington a new underground cable of the latest design, containing 80,000 miles of wire. This will be an important addition to the underground facilities connecting the seaboard cities from Washington to Boston."

The company has provided telephone facilities and toll connections at cantonments, national guard camps, division headquarters of the army and navy, army posts, navy yards, aviation fields, supply, quartermasters' and training camps munition plants, ship-building yards and various federal and state camps and headquarters located throughout the country. Some of the specially organized telephone plants have facilities equivalent to what are required to serve cities of 30,000 or 40,000 population.

The virtual reconstruction of the coast guard telephone system has been undertaken by the company, involving the connecting of 100 lighthouses, 200 coast-guard stations, the laying of 300 miles of submarine cable, 650 miles of pole line and the stringing of more than 1,200 miles of wire.

The Bell system has been called upon also to manufacture and supply telephone equipment for the use of the army and navy in this country and abroad.

Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies—Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchises, Rates and Service

Rate Increase Granted at Sutton, Neb., Without Hearing.

Without undergoing the tortures of a rate fight or a hearing before the Nebraska State Railway Commission save on ex parte testimony, the Lincoln Telephone & Telegraph Co. has been awarded a substantial increase of rates on its Sutton exchange. The old rates were: One-party business, $1.50 per month; one-party residence, $1; farm residence, $1; with extensions at 50 and 75 cents. The new rates are: One-party business, $2.50; one-party residence, $1.50; two-party residence, $1.25.

It cost the company $20,000 for the privilege. A year ago it bought the exchange from local parties who had milked it for heavy dividends in the last few years of ownership—a magneto service unsatisfactory in character was given and the property was in a poor state of repair. A thorough job of reconstruction has been completed and a common battery service is now offered. An interchange with Clay Center, the county seat, is also given.

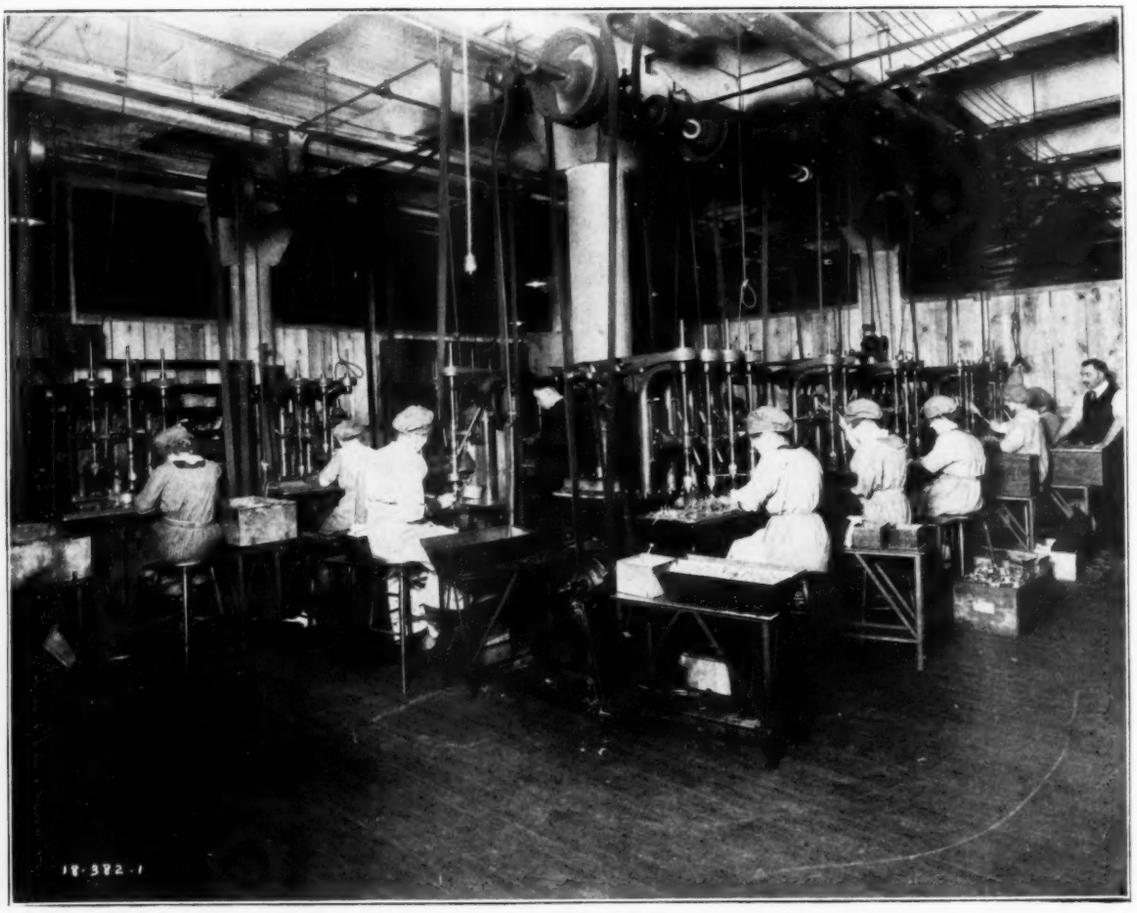
In the opinion handed down by the commission it says that 312 of the 318 patrons affected consented in writing to the increase, and that the others can have magneto at the old price if they wish it. No hearing was necessary, says the opinion, for the reason that the new rates did not promise much return on the amount expended for reconstruction, to say nothing of a return in whatever additional value may attach to the old property left in use.

The company has operated the plant since the time of purchase and the revenues for the year were $8,385; operating expenses and taxes, $5,439; current maintenance, $1,190, leaving a surplus revenue of $1,756. It estimates the annual revenues under the new rates, which make no change in farm changes, and including toll commissions, will be $10,117.

The opinion of the commission continues:

"The company estimates the replacement or reproduction new value of the plant to be $43,470, and that the expenses of operation and taxes will be in the neighborhood of $9 per station annually.

Why Telephone Op



THE AUTOMATIC SYSTEM

Automatic Electric

erators Are Scarce

Men formerly ran these drill presses.

Today girls earn from $70 to $80 per h at this work.

They are on duty only 45 hours a e.

No Sunday or Holiday work—Saturafternoon off.

Thousands of girls prefer this better nd shorter hours to operating switchds.

REQUIRES NO OPERATORS

Company, Chicago

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

The commission cannot, for want of testimony on the subject, place any valuation upon the property, but a valuation is not necessary at this time in order to protect the rate-payers.

The estimate as to operating costs is in line with the expense of other companies, and since it is subject to the limitation of actual expenditures, its acceptance likewise jeopardizes no rights. The estimate of the plant's annual requirements for all purposes is as follows: Maintenance and depreciation at 9 per cent, $3,912, other expenditures, 604 stations at $9 each, $5,436; total, $9,348.

Deducting the foregoing estimate from the estimated revenue leaves the sum of $769 in surplus revenues. A return of 7 per cent on the amount expended in the reconstruction of the plant $20,780, is $1,455; and upon the purchase price of the plant, $15,000, is $1,050; or to complete the return in another form the estimated revenue available for that purpose, $769, will yield a return of 7 per cent upon the amount of $10,983 only. It is manifest, therefore, that the new rates are not excessive or unreasonable, and they will be approved subject to restriction as to the use which may be made of the revenues derived therefrom until the further order of the commission."

Government Ownership an Issue in District of Columbia.

The Public Utilities Commission of the District of Columbia has suspended action on the rate increase sought by the Chesapeake & Potomac Telephone Co. pending Congressional action on the proposal of the postmaster general to take over and operate the district telephone system. The commission's order says:

"The testimony taken in the matter of the application of the Chesapeake & Potomac Telephone Co. for an increase in rates clearly indicates that the company is entitled to some relief.

"The commission is bound, in serving the interests of the public, to take this offer (of the government) into consideration. The postmaster general cannot act upon his offer without legislative authority. Therefore, the commission will suspend action on the application of the telephone company for a short time, so that Congress, if it sees fit, may give the postmaster general the authority he needs to make his offer effective."

The plan for government control briefly is this:

To pay the company for the business at a fair valuation set by the utilities commission from postoffice revenues.

Retention of present officials and experts.

Retention of present employes.

No reduction in wages nor increase in expense.

By a vote of 149 to 101, the House, on February 28, took the Jackson bill for government ownership of telephones in the district away from the district committee and referred it to the postoffice committee.

On March 8 Senator Sheppard of Texas introduced a bill in the Senate giving the President power to take over the telegraph, telephone and cable lines and radio stations under the same conditions as the railroads are now being controlled.

Municipal Ownership of Utilities an Issue in New York.

Considerable interest is being taken in the Wagner-Hearst-Donohue municipal ownership bill now before the New York state legislature. Under the provisions of this bill, before any public utility corporation may be acquired by the city, a concurrent resolution must be adopted by the board of estimate and the board of aldermen, and then the proposal must be submitted to the people at the next general election or at a special election on the first Tuesday in April.

Another provision of the bill gives the initiative to the voters. This section provides that 10 per cent of the enrolled voters may petition the authorities to take over the public utilities. The bill provides for the issuance of revenue bonds to finance public utilities acquired by the city.

A public hearing on this bill was scheduled to be held on Tuesday of this week and a call was issued by the secretary of the New York State Conference of Mayors to mayors and corporation counsels of all state cities to be present at this hearing.

The state conference of mayors recently went on record as favoring municipal ownership of public utilities.

Supreme Court on Taxation Value of Telephone Property.

The Lincoln Telephone & Telegraph Co. lost the suit which it brought in the supreme court against Johnson county, Nebr., to require the state board of equalization to assess its taxable property at the same percentage of actual value as it did other taxable property in the county, including the farm lands particularly.

The case is regarded in Nebraska as of widespread interest, since the railroads have yearly voiced a similar protest and have shown that whereas they are assessed on the actual value of their property, many farm lands are valued for taxation purposes at 50 to 60 per cent of the actual money for which they have been sold within a year. The roads, however, have never been able to get the state officers to act favorably upon their plaint.

The court says that "Under a mandatory, unambiguous statute making actual value the standard for purposes of taxation, an owner of taxable property cannot require the board of equalization to value it at 75 per cent of its actual value on the plea that the taxing officers generally conform to a custom to make such a reduction."

The company had returned the property in Johnson county at $172,225, but when it discovered that the other property owners were returning theirs or being assessed at figures much below actual value, it asked the county board to reduce it to conform with the basis of these others. It refused, and the dispute finally landed in the supreme court.

That tribunal says that no official custom and no officer can make 75 per cent of the actual value of a lawful standard for purposes of taxation under the present revenue law. If the plaintiff has pleaded facts as they exist, its remedy is such action on its part as will compel the valuing of all property at 100 per cent and not in asking a reduction to 75 per cent of its own.

The fact that such a remedy places a burden of proving all other values complained against as being below actual value and that this is a big task, cannot relieve the court of the necessity of following the direct mandate of the statute and ordering taxable property assessed at 100 per cent, when that value is admitted by the pleadings.

Back of it all is the fact that some years ago the company secured an increase in rates in the county after a strenuous fight.

New York Telephone Tapping Bill Declared Too Lenient.

The committee on the amendment of the law of the City Bar Association disapproved of Assemblyman Leininger's bill, recently introduced in the New York assembly, making it a felony to tap telephone wires because it thought the bill not rigorous enough. In a bulletin sent to Gov. Whitman and members of the legislature, the committee says that conversations over the telephone should be as safe from eavesdroppers as letters as a fundamental principle of civil liberty and constitutional right.

The Leininger bill would make it a felony to use a device to overhear telephone conversations except on the written approval of the United States district attorney or by orders from an officer or member of the United States secret service. The committee urges "that no one should be permitted secretly or clandestinely to intercept conversations over the telephone."

Telephone Company at La Grange, Ind., to Increase Rates.

The Indiana Public Service Commission issued an order recently fixing rates for and otherwise regulating the Northern Indiana & Southern Michigan Telephone, Telegraph & Cable Co., of Lagrange, Ind., which serves patrons in La-

grange and Steuben counties. Under the new schedule the company will be permitted to charge $2.25 a month for business telephones and $1.75 a month for residence telephones, instead of the old rates of $2 and $1.50, respectively.

In making up the schedule the commission fixed the company's valuation at $146,837, which includes $10,000 for going value. The utility was ordered to charge off annually 5 per cent for depreciation. It was permitted to make a 7 per cent return on the valuation. The operating and maintenance expense was given as $20,100.

Seek to Amend Texas Law in Regard to Rate Regulation.

Governor W. P. Hobby of Texas is being urged by the city authorities of San Antonio to submit to the legislature an amendment to article 1028, Revised Civil Statutes, 1911, with reference to regulation by court of rates and charges of public utility corporations. This is in reference to the controversy between the Southwestern Telegraph & Telephone Co. and the city of San Antonio, in which the telephone company is seeking to increase its rates on all lines of service.

The law as it now stands provides that the rates fixed must be sufficient to yield such public utility company not less than 10 per cent upon the investment, and the same shall continue in force for a period of three years. This is regarded as arbitrary and legislation is desired to amend the law so that reasonable rates shall be charged.

Restriction of Free Exchange Service Brings Protest.

The enforcement of a new rule of the Lincoln Telephone & Telegraph Co. in a part of its territory where it offers rural subscribers the choice of two market towns, but restricts the town subscribers to the town and the lines attached thereto has brought considerable embarrassment to some of its subscribers and landed the company before the Nebraska State Railway Commission on March 4.

An amusing feature of the situation is that it cuts off a Beaver Crossing doctor from about half of his patients, when the latter, exercising the right of choice as to which two market towns, as farmers, they desired, they chose Cordova and Exeter. The doctor was most strenuous in his protests, but was willing to pay whatever rate was necessary to obtain service whereby they could call him. He told the commission that as a result of this change in telephone service rival doctors at Exeter were thriving fat off his former patrons.

Cordova is halfway between Beaver Crossing and Exeter, on a north and south line, and the exchanges were formerly operated by different companies that sold out to the Lincoln. In rearranging the zones of these exchanges, the company found it necessary to restrict the amount of free service given, and with this the railway commission was in accord.

The trouble for the Beaver Crossing doctor came when the farmers living north of Cordova, where he had had a large practice, chose Cordova and Exeter as the two towns to which they desired free service. When they found they had to pay ten and fifteen cents to call him over the telephone, they began calling the doctors at Exeter.

Two other complainants were retired farmers, one of whom found himself compelled to pay toll to call up his tenants and the other was similarly separated from his two sons. Various methods were suggested to overcome the trouble, but objection was found to each. The doctor finally agreed to go out in his automobile with a telephone company man and help solicit the farmers to substitute Beaver Crossing for Exeter on their list of two free service towns.

Increase in Rates Authorized at Vermilion, S. D.

The Northwestern Telephone Exchange Co. has been authorized to increase all of its exchange rates at Vermilion, S. D., 25 cents per month. The new gross rates are: Business telephone, single line, $2.50 per month; business telephone party line, $2; residence telephone, main line, $1.75; residence telephone, two-party line, $1.50; extension sets, $1.25. All of these rates are subject to a discount of 25 cents per month for payment by the 15th of the month.

From the testimony taken at a hearing before the South Dakota Railroad Commission it appears that the Vermilion exchange has been rebuilt and that before proceeding to rebuild the exchange a petition was circulated in which 438 subscribers agreed to the proposed increase in rates as soon as the company had installed a modern, up-to-date common battery system.

In order that the company might be permitted to earn a reasonable return on its investment, the commission found that the increase was necessary and accordingly issued its order.

Physical Connection Ordered at Lake Andes, S. D.

The South Dakota Railroad Commission, on February 28, ordered the establishment of a physical connection between the rural lines owned and operated by the Lake Front Telephone Co. and the switchboard owned and operated by the Dakota Central Telephone Co. in Lake Andes, S. D., as soon as the complainant, the Lake Front company, establishes and puts into effect a rate which shall not be less than that of the defendant for similar service in the locality of Lake Andes.

The connection when made, the commission's order further specifies, shall be covered by a contract containing a provision that the defendant shall perform switching service for the subscribers of the complainant at its Lake Andes exchange at a rate not to exceed $3 per year.

It appears from the evidence in this case that the line now operated by the complainant parallels for practically its entire length the line of the defendant, over which nearly all of the present subscribers of the complainant formerly received telephone service. The poor quality of the service furnished by the defendant was given as one of the causes contributing to the construction of the new line.

It is clearly evident, the commission states, that the installation of the second plant by the complainants has introduced a competitive condition and that if the connection were ordered and the complainant permitted to continue to operate on the assessment basis while the defendant operated under its regular rate schedule great irreparable injury might result to the defendant. It would lose its subscribers to complainant. The commission was, therefore, of the opinion that the connection should be ordered providing the property interests of the respective companies can be protected.

Safety Precautions in Installing Telephone in Building.

In reversing the finding of the Pike circuit court, Pikeville, Ky., in the case of Cohen & Stryck against the Eastern Kentucky Home Telephone Co., the court of appeals, in the decision, stated:

"Telegraph and Telephones-Construction and Maintenance: It is the duty of a telephone company in installing in a building a telephone, to exercise reasonable care as to make it reasonably safe from the effects of lightning which might be conducted into the building over the wires of the telephone, and this duty to exercise reasonable care likewise extends to the proper maintenance of the telephone in the building after it shall have been installed.

But, if the installation is unsafe, or afterwards becomes so, and the patron of the telephone company has knowledge of it, it would become his duty to notify the company of the fact and it should remedy the defect within a reasonable time thereafter."

Evidence of Lineman Not Held to Be Prejudicial Error.

The admission of the evidence of an experienced telephone lineman, that electrical wires will break in a certain manner, was not prejudicial error.—Lewis vs. Harvey; Supreme Court of Kansas; 168 Pacific, 856.

Summary of State Commission Hearings and Rulings.

GEORGIA.

February 22: Canton Telephone Co., of Canton, Ga., authorized to increase its capital stock from $2,850 to $10,000.

February 22: Bethlehem Telephone Co., of Statesboro, Ga., authorized to issue a small amount of capital stock.

ILLINOIS.

February 20: The commission approved a joint contract between the receivers of the Central Union Telephone Co. and the Saybrook Telephone Co., providing for the connection of their lines at Saybrook, and the connection of the toll lines of the Central Union company to the exchange of the Saybrook Telephone Co. No. 7725.

February 20: The Highland Telephone Co. was authorized to increase its business telephone rates from $24 to $30 per year, and other rates in proportion. The Highland Telephone Co. has purchased the telephone property of the Central Union Telephone Co. at Highland and merged the two systems, installed new central office equipment and practically rebuilt the entire system, at considerable expense. The commission places the value of the plant at $40,133. The commission finds that an annual allowance of $3,310 is sufficient to cover future accruing depreciation; that with the new rates in effect the income will be $3,119 per year, which will allow a return of 6.47 per cent on the cost of reproduction value. No. 7045.

March 13: Hearing on the application of the Pitcher Telephone Co. for authority to issue its notes in the aggregate amount of $6,500.

INDIANA.

March 7: Hearing at Lafontaine on the application of the Lafontaine Telephone Co. for permission to increase its rates.

March 20: Hearing at Fort Wayne, Ind., on the proposed merger of the Home and Bell telephone exchanges in Fort Wayne and the combination of the toll lines of the two companies under the supervision of the Bell company. The merger includes the selling by the Home company of its interests in Kendallville and Auburn for $62,500 and the purchase of the Fort Wayne property of the Bell company for $10,000.

MINNESOTA.

March 19: Hearing at Dassel, Minn., on the application of the Dassel-Collinwood Telephone Co. for an increase in its local and rural telephone rates in Dassel and vicinity.

March 21: Hearing at Worthington on the application of the Worthington Telephone Co. for permission to increase its local telephone rates in that city.

March 21: Hearing in the matter of the application of the Bigelow Telephone Co. for authority to increase its rates for business, residence and rural telephone service within the village of Bigelow.

MISSOURI.

February 28: New schedule of rates filed by the Rockville (Mo.) Telephone Co. with slight increase in the rate for rural service.

NEBRASKA.

March 3: Complaint filed by F. O. Bostrom against the Lincoln Telephone & Telegraph Co. in regard to poor service on the Hebron exchange.

March 3: Complaint filed by A. Redford, of Grafton, against the Lincoln Telephone & Telegraph Co. in regard to poor service.

March 4: Hearing had upon complaint of Dr. Hewitt and others against enforcement of new rule of the Lincoln Telephone & Telegraph Co. on Beaver Crossing exchange giving rural line subscribers choice of town exchanges; continued for further development.

March 4: Hearing had in matter of giving consolidated service on Hampton exchanges of Hamilton County Independent Telephone Co. and Lincoln Telephone & Telegraph Co.; continued to give subscribers of both exchanges at Hampton opportunity to file formal complaint asking consolidation, the Hamilton county company being unable to make either a buy or sell proposition.

March 5: Application filed by the Pierson Telephone Transmitter Co., of Topeka, for permission to sell $53,000 worth of preferred stock.

March 5: Application filed by the Hamilton County Independent Telephone Co. for permission to sell $1,000 worth of stock.

March 5: In the matter of the protest of the Hooper Telephone Co. and the Farmers Telephone Co., of Dodge county, against the granting of permission to the Nebraska Gas & Electric Co. to erect high voltage transmission lines adjacent to their telephone wires—the two protesting companies having agreed to waive objections until after the construction work has been completed—the commission issued order of approval of permit but retains jurisdiction of whole matter.

March 6: Application filed by the Ansley Telephone Co. for permission to make a charge of 10 cents for all night calls.

NEW YORK.

February 28: Complaint filed by representatives of some 75 patrons and toll users of the Glen Telephone Co. relative to the toll charges which went into effect February 1.

OHIO.

February 19: Joint application filed by the Mount Vernon Telephone Co. and the Central Union Telephone Co. for permission of the latter to sell its properties in Mount Vernon and vicinity to the former.

February 26: New and increased schedule of rates filed by the Ohio State Telephone Co. for the city of Canton.

February 28: The commission authorized the Cincinnati & Suburban Bell Telephone Co. to increase its capital stock from $12,000,000 to $16,000,000.

March 3: Petition filed by the Central Union Telephone Co. for the approval of the sale of its property in Champaign county to the Urbana Telephone Co., of Urbana, Ohio.

March 5: Petition filed for authority to allow the Central District Telephone Co. to sell its properties to the Chesapeake & Potomac Telephone Co. of West Virginia for the sum of $2,664,940.

March 11: Hearing on the proposed increase in rates filed by the Ohio State Telephone Co. for the city of Toledo.

PENNSYLVANIA.

February 22: Hearing on the contract between the city of Philadelphia and the Keystone Telephone Co. for telephone service.

February 27: Petition filed by the Economy Telephone Co., of Meyersdale, for an increase in rates.

February 27: Complaint filed against the service rendered by the Wimore Rural Telephone Co. of Cambria county.

SOUTH DAKOTA

December 27: The commission granted the application of the Dell Rapids Telephone Co. for authority to increase its rates at Trent as follows: Single line business telephone, $2 per month; single line residence telephone, $1 per month; rural party line, $1.50 per month. The old rates were $1.75 for business telephones and $1.25 for residence and rural telephones, with a discount of 25 cents per month for payment by the 20th. No. 479.

February 28: Physical connection ordered between the rural lines owned and operated by the Lake Front Telephone Co. and the switchboard owned and operated by the Dakota Central Telephone Co. in Lake Andes, as soon as the former company, the complainant, establishes and puts into effect a rate which shall not be less than that of the defendant for similar service in that locality. The defendant is authorized to charge a switching rate not to exceed $3 per year. F-410.

February 28: The commission authorized the Tripp Telephone Co., of Tripp, S. D., to increase its exchange rates from $1.50 to $1.75 per month for single line business telephones; from $1 to $1.25 per month for single line residence telephones and for rural party line service. The exchange rates are subject to a discount of 10 cents per month for payment by the 15th and the rural rates are likewise subject to a discount of 10 cents per month for payment by the 15th of the first month of the quarter. No. 2720.

February 28: The commission authorized the Northwestern Telephone Exchange Co. to increase all of its rates at Vermilion, S. D., 25 cents per month.

WISCONSIN.

March 7: Hearing on the application of the Oregon (Wis.) Telephone Co. for authority to increase rates. U-1278.

March 8: Hearing on the application of the Oostburg (Wis.) Telephone Co. for authority to increase rates. U-1281.

March 13: Hearing on the application of the Farmers Telephone Co., of Beetown, for authority to increase rates. U-1280.

March 13: Hearing in regard to telephone rates charged by the Farmers Telephone Co. and the Peoples Telephone Co., of Mt. Hope, at Bloomington and at Bagley. U-1279.

March 13: Hearing in the village hall at Manawa in regard to the alleged refusal of the Manawa Telephone Co. to extend service to Ed Schmidt et al. U-1224.

March 14: Hearing on the application of the Stockbridge & Sherwood Telephone Co. for authority to increase rates. U-1284.

March 19: Hearing on the application of the Merton (Wis.) Telephone Co. for authority to increase rates. U-1285.

March 20: Hearing on the application of the Melville Settlement Telephone Co. for authority to increase rates. U-1286.

March 21: Hearing on the application of the Rural Telephone Co., of Crystal Lake, for authority to increase rates. U-1287.

March 22: Hearing on the application of the Matteson Telephone Co. for authority to increase rates. U-1290.

March 25: Hearing on the application of the Barneveld & Ridgeway Telephone Co. for authority to increase rates. U-1291.

March 27: Hearing on the application of the Wautoma-Mt. Morris Telephone Co. for authority to increase rates. U-1292.

March 27: Hearing on the application of the Shields Telephone Co. for authority to increase rates. U-1293.

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

921. Why is the number of trunks needed dependent upon the "holding time" and other traffic constants? How must the mechanical law of probability be augmented in determining the total number of telephone trunk circuits required for any given busy hour of traffic? Give an illustration of the difference between the number of simultaneous telephone connections and the number of trunks required. Is the relation between the number of trunks required and the busy-hour traffic susceptible of being expressed in workable formulæ?

922. Show from the curve in Fig. 269 how many trunks will be required to serve a busy hour traffic of 900 calls, assuming that all the line circuits are in one group. Explain why the number of trunks determined for any given condition from the curve in Fig. 269, must be modified to cover relative efficiency of trunks for the size of the group which they serve. Does the curve in Fig. 269, when interpreted from the data in the curve of Fig. 266, provide a liberal trunk equipment or a conservative one?

923. Give an illustration of the difference between large trunk groups and small trunk groups by determining: (a) The total number of trunks required to serve all the subscribers' lines placed in groups of 25 lines each in an exchange having a busy-hour traffic of 700 calls and serving 1,000 lines. (b) The total number of trunks required to serve all the subscribers' lines placed in groups of 100 lines each in an exchange having a busy-hour traffic of 700 calls and serving 1,000 lines.

924. Using the formula given in section 924, determine the number of trunks required to handle 1,000 calls per hour at an average "holding time" of two minutes (1/30th of an hour). Determine the number of trunks required to handle a traffic of 200 calls assuming an average "holding time" of three minutes (1/20th of an hour.

CHAPTER XXVIII. Nature of Telephone Traffic (Continued).

925. *Conservative basis of traffic figures.*—While the occurrence of telephone traffic follows the law of mathematical probability very closely, it is obvious that, in any concrete application, the number of subscribers' line circuits involved must be very large, indeed, in order that the possibility of wide variations from the observed values may be eliminated from traffic calculation.

In other words, should a study be made in an exchange area serving 10,000 subscribers' circuits, it would be the part of wisdom to allow for some variation from all the observed traffic data. On the other hand, should the study apply to traffic in an exchange serving 500,000 stations, it is obvious that the variation in one division of the exchange would be offset, in part at least, by variations in others.

It is for this reason that the curve in Fig. 269 and the formula of Section 924, have been worked out on a very liberal basis. As a practical expedient it is often possible to install less connecting equipment than the curve and formula given would indicate as necessary for the minimum requirements. In such cases, it is most essential that the *ultimate* capacity in connecting circuits be made sufficiently high to permit of the addition, as required, of connecting circuit equipment without confusion.

926. *Estimating traffic for new offices.*—In case the question at hand involves the provision of new equipment in the quantity required to handle the probable traffic in a non-existent telephone office, one which is to be added in an exchange area already served from one or more offices, the primary determination of traffic requirements to be met becomes somewhat more difficult. In such a case, lines are to be transferred from one or more of the existing telephone offices and connected to the new office. This new office must be provided with trunking connections to the others in the exchange area.

The difficult feature of such a problem is to determine the probable number of originating calls that will occur in the new office, the probable number of outgoing trunk calls from the new office to each of the others, and the probable number of incoming trunk calls from each of the existing offices to the new one.

In brief, a survey must be made of the subscribers' circuits which are to be connected to the new office and this survey should show the total number of subscribers' stations of *each class* involved. It is necessary then to derive, either from existing records or from a series of observations, the total number of originating calls per line circuit per day for each of the several classes of service involved.

With this information, a rough determination can be made of the probable

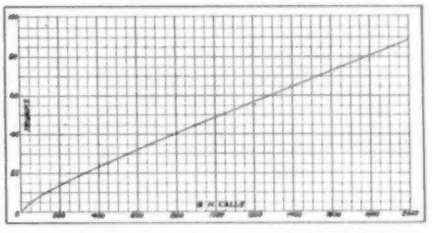


Fig. 269. Trunks for Various Values of Busy-Hour Traffic, Two-Minute Average Trunk Time.

number of originating calls that will be offered to the proposed new office switchboard when the lines are cut over. It is extremely difficult to determine the probable number of outgoing trunk calls because the very fact that a new office is being added, disturbs the distribution of trunked traffic. With mechanical switching systems it is possible to obtain an accurate record in most cases, of calls which are trunked from one group of lines to other groups.

The best that the engineer can do, however, when working with manual equipment, is to take all of the local factors into consideration, make such traffic counts as the local conditions seem to indicate, and to qualify the computed results by the exercise of careful judgment based on expert knowledge of conditions. Manual equipment is conventionally so built as to permit of the expansion of the trunking portion of the switchboard equipment without any violent rearrangement or readjustments.

927. *Preliminary calculation of outgoing trunk calls.*—A rough basis on which the preliminary calculation as to the probable number of outgoing trunk calls in the proposed new office may be made is as follows:

If all of the multiple jacks in all offices in the entire exchange area were equally likely to receive calls for their associated line circuits, it is obvious that the proportion of originating calls which

would be completed in the multiple jacks of the new office, would be the same as the proportion of the total number of multiple jacks in all the offices of the entire exchange area that would be found in the proposed new office.

This means, for instance, that if the new office should contain 5 per cent of the actual working lines in multiple in all offices in its exchange area, then 5 per cent of the calls originating in its new office would be completed in its own local multiple jacks. In practice, however, it is found that the telephone traffic is more apt to flow to telephone stations located in the same neighborhood, other things being equal, than to telephone stations served from a distant office.

This "community of interest" factor is almost always more than 110 per cent and less than 150 per cent. Should it be found that the "community of interest" factor in the illustration was 120 per cent, then not 5 per cent but 120 per cent of 5 per cent, or 6 per cent of the originating traffic in the new office, would be completed in its own multiple. It is obvious, therefore, that the assumed conditions for the proposed new office would mean that 6 per cent of the originating traffic would be completed through the local multiple, leaving 94 per cent that must be trunked to other offices.

Conservatively used, this method is very satisfactory for the purpose of roughly determining the amount of probable total outgoing trunked traffic from a proposed new office.

928. *Ten per cent trunking.*—In the design of mechanical switching equipment for telephone exchanges one of the expressions often heard is "ten per cent trunking." This expression usually means that ten connecting circuits, or trunks, are accessible to each group of 100 subscribers' lines or that five connecting circuits or trunks are accessible to each group of 50 subscribers' lines.

It is perfectly obvious that in both cases —ten trunks per group of 100 subscribers' line circuits and five trunks per group of 50 subscribers' line circuits—the number of trunks is 10 per cent of the number of line circuits.

929. *Illustration of trunking factor.*—It is not by any means true that the individual trunks in the two arrangements are of equal efficiency. This fact will be at once apparent when it is remembered that the group factor for trunks serving line circuits for any given calling rate, in groups of 50 lines per group, is higher than the group factor for trunks serving 100 lines per group.

A concrete illustration of this fact is found in the following conditions which fell within the experience of the author. In a certain exchange the total number of calls handled during the busy hour was found to be about 1,800. From the curve in Fig. 269 it will be seen that 1,800 busy-hour calls, assuming an average holding time of two minutes, should require about 80 trunks, provided the trunks were all combined into one large group.

In the case under consideration, however, the trunks were not combined in one large group, but were arranged so that they served the subscribers' lines in groups of 50 circuits per group. There were 1,500 subscribers' line circuits, so the busy-hour calling rate for the entire office was 1.2 calls per subscriber's line circuit.

The multiplying factor, due to the use of groups of 50 lines each for an average calling rate, for the entire office, of 1.2 calls per subscriber's line per busy hour, is 1.7. At the average busy-hour calling rate—1.2 calls per line—each group would probably originate 50 times 1.2 or 60 calls per busy hour. These calls, however, according to the law of probability, would not be uniformly distributed throughout the hour and therefore the multiplying factor must be used to determine the probable number of simultaneous connections for the small group of 50 lines.

On this basis connecting equipment must be provided, for each group, to serve 1.7 times 60 calls, or the equivalent of 102 calls, during the busy hour.

From the curve in Fig. 269 it is found that 102 calls during the busy hour require about eight trunks. This is the condition that was found to exist in the office referred to and the service to subscribers was not satisfactory owing to the fact that less than this number of trunks were provided for each line group. In Fig. 270 are given several curves for various busy-hour calling rates which may be used to determine the multiplying factor for the arrangement of lines into groups of various sizes.

It is extremely important that this quality of telephone traffic be thoroughly understood. Equipment must be provided, in order to afford commercial service, considerably in excess of the *apparent* requirements as shown by average values. This is due to the facts that traffic does not flow through the telephone office in a uniform stream, calls cannot be handled in orderly sequence while giving satisfactory service, and the ability of the equipment to furnish service at peak load is dependent upon the number of connecting circuits or trunks provided.

(*To be continued.*)

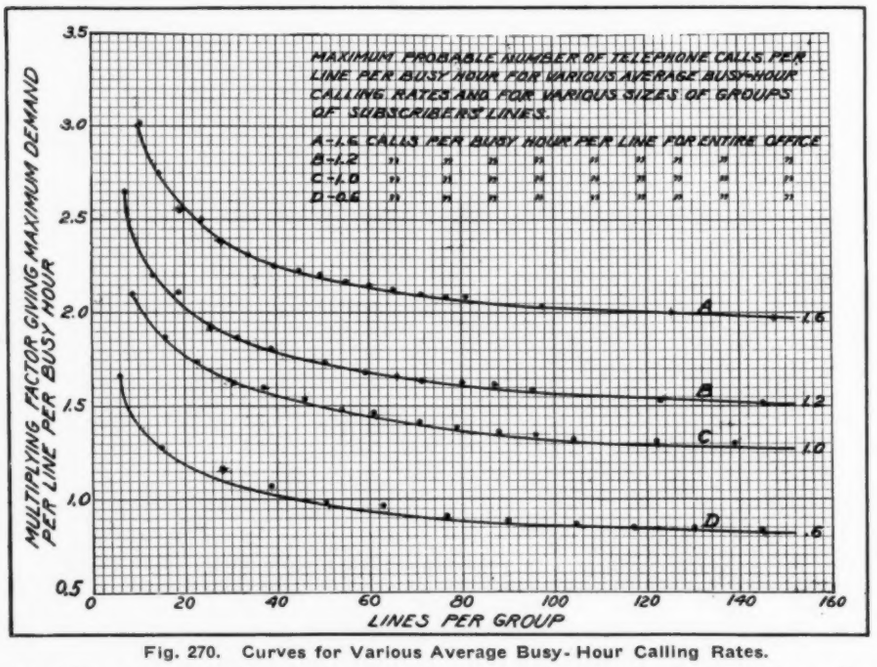


Fig. 270. Curves for Various Average Busy-Hour Calling Rates.

Port Clinton, Ohio, Exchange Now in New Quarters.

The Ottawa County Telephone Co., of Port Clinton, Ohio, has moved from its old quarters in the Masonic Temple building to its new home in the old Payne drug store. The building has been entirely remodeled and a new front added. The operating room is located on the second floor and the lower floor is occupied by a model storeroom. The work of remodeling the building was carried on under the supervision of Manager J. G. Steinkamp.

Telephone Companies in McKinney, Texas, to Consolidate.

The McKinney Telephone Co. and the Union Telephone Co. at a meeting held in McKinney, Texas, last month, agreed to accept the ordinance terms recently passed by the city commission and the two companies will merge, the McKinney Telephone Co. taking over the Union company and consolidating the two exchanges as soon as the work can be done.

What Is Your Company Doing?

Chats About Company Doings.

By Stanley R. Edwards.

An installer while engaged in P. B. X. work, was standing on a 10-foot upright ladder about six feet from the top. One of the uprights supporting the ladder broke off six inches from the ground, causing the installer to fall. In his fall he struck a window casing and wrenched his right shoulder. Inspection of the ladder before he used it, would have prevented this accident.

In Tonopah, Nevada, men were working on a cable pole putting on double cross arms and placing a cable box. A hammer used by one of the men slipped and fell. At the same instant a negro stepped from under an awning below and the hammer hit him on the head. Undoubtedly thickness of the skull saved the negro from a serious injury. Had the hammer fallen on a white man, the result undoubtedly would have really been a case of trepanning.

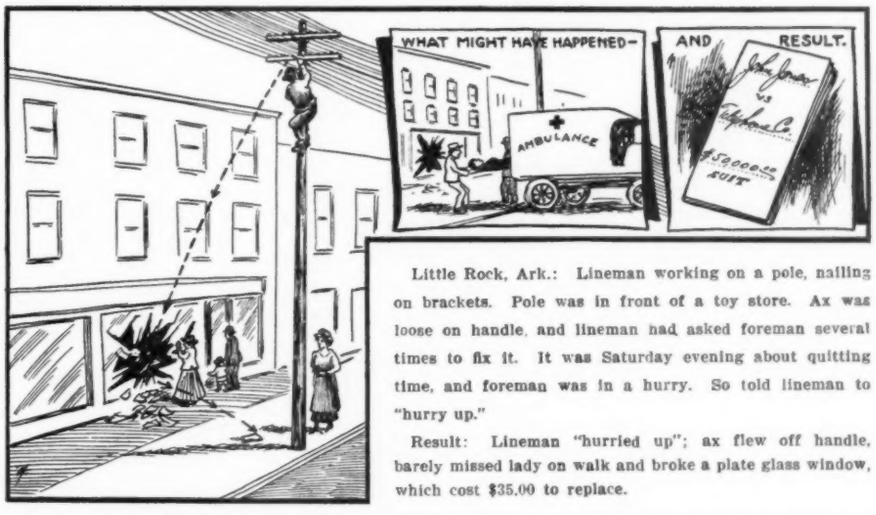
Another accident due to carelessness of workmen on a pole is shown in the illustration reproduced from the Safety First Bulletin of the Texas Telephone Co.

Carelessness is responsible for many accidents. In Winters, Cal., two linemen were stringing open telephone wire over a power lead. The wire slipped from the hands of one of the men and dropped on the power lead. The man on the other pole was seriously injured but was fortunate to escape with his life. He was unable to work for seven months and then was able to do only very light work.

"Tell it to the people" is a phrase that made an impression on the manager of the Modern Telephone Co. when he was reading one of the various papers which come to his office. He had been greatly impressed with the advertisements of the Texas Telephone Co. which were reproduced in TELEPHONY and decided to make use of them in his weekly advertisement.

Owing to his limited space he did not use all the ammunition given in each advertisement of the Texas company. He decided to make a number of advertisements and the first one is shown on this page. It deals with the increased cost of all materials used in telephone work.

Last fall A. C. Brokaw, advertising manager of the Tri-State Telephone & Telegraph Co., inaugurated an advertising campaign in St. Paul and Minneapolis, utilizing billboards and painted bulletins. A number of these are grouped in the accompanying illustration. Over 200 boards were used all told. The signs and bulletins were placed along the main thoroughfares, at transfer points, etc.



Little Rock, Ark.: Lineman working on a pole, nailing on brackets. Pole was in front of a toy store. Ax was loose on handle, and lineman had asked foreman several times to fix it. It was Saturday evening about quitting time, and foreman was in a hurry. So told lineman to "hurry up."

Result: Lineman "hurried up"; ax flew off handle, barely missed lady on walk and broke a plate glass window, which cost $35.00 to replace.

"Safety First" Bulletin of the Texas Telephone Co. and Associated Companies Tells a Story Graphically and to the Point—Actual Occurrences Are Cited as Examples.

MODERN TELEPHONE COMPANY
INDEPENDENT
TELEPHONE
INDEPENDENT CITY, ILLINOIS

THE TELEPHONE AND THE HIGH COST OF LIVING

A comparison of the prices of a few materials used for installing telephones and maintaining the plant on August 1, 1914, and on September 14, 1917, shows that:

Glass insulators increased from $19.07 to $28.09 per 1,000—an increase of 47%.

Ground rods, from 19 cents each to 37 cents—95%.

Lead covered cable, 100-pair, from 20 cents to 45 cents a foot—125%.

Iron telephone wire, No. 12, from $3.70 per cwt. to $8.25—123%.

Rubber covered telephone wire, No. 19, from $7.92 to $15.18 per 1,000 feet—92%.

Weatherproof iron telephone wire, No. 14, from $12.10 per cwt. to $20.60—70%.

Bare copper telephone wire, No. 10, from $25.00 to $68.06 per mile—170%.

Telephone switchboards from 51% up; poles from 36% to 57%; hardware for poles 218%; subscribers' telephone instruments, 47%; and tools from 46% to 119%.

Compared with everything else you buy, do these figures not indicate that the telephone service is cheaper today than it was in 1914? We are not raising the rates.

Modern Telephone Company
The Independent Building
Cor. Service and Progress Streets
Contract Dept. No. 100

The Modern Telephone Co. Runs an Advertisement Each Thursday in the Local Evening Paper at a Cost of $4.20. This is the Full Size of the Advertisement.

The painted bulletins were electric lighted in every instance—a few being provided with mechanical attachments to produce alternating light and dark effects, running lights, etc.

The painted boards remained in service all winter and a similar campaign will be instituted with the opening of spring.

The bull's-eye center is in black with white letters; the outside circle, solid red; while the copy, proper, on the right, is in black with white letters with the shield in red, white and blue.

"The King of Telephone Destruction"—that is the title which D. G. Raley, manager of the Ohio State Telephone Co., Salem, Ohio, submits as a name for the drawing published March 2 in this department of TELEPHONY. Thinking of our experiences in the January blizzard around Chicago, we would suggest "The King of Isolation."

Another "hat is in the ring" of 100 per cent collections! Frankly, though, we expected that E. D. Schade's challenge of "Who can beat this?" published last week would find a taker in the person of W. M. Brown, general auditor of the Central Home Telephone & Telegraph Co., Louisville, Ky. His "hat is in the ring" and all qualifications presented as a real contender for the 100 + per cent Collections Championship Sweepstakes.

Says Mr. Brown under date of March 10:

"As is my custom, I was reading with a great deal of interest this morning in the March 9 issue of TELEPHONY, 'Chats About Company Doings,' when all of a sudden I came to a full stop on account of my name being taken in vain. I can-

Some Billboard Signs and Painted Bulletins of the Tri-State Telephone & Telegraph Co. in St. Paul, Minneapolis and Vicinity.

not allow the gentleman from Johnstown to win on this count, unless he can produce a good deal more dope than is shown in your paragraph.

As an exponent and propounder of 100 per cent collections, I am primarily interested in the most efficient and economic methods of getting the 100 per cent and

to that end, for several years past, we have been doing away with the collectors. Just in order to show you that our friend from Pennsylvania does not win, I quote you a list of plants, which not only collected 100 per cent for the year of 1917, but finished the year without a dollar outstanding on their books and in addition, their advanced collections are indicated by the amounts set opposite their names:

Carrollton Telephone Exchange Co., M. M. Welch, manager: No balances on books December 31, 1917. Service collected in advance	$ 489.70
Owenton Telephone Co., J. W. O'Bannon, manager: No balances on books December 31, 1917. Service collected in advance	228.70
Cynthiana Telephone Co., C. M. Mynheir, manager: No balances on books December 31, 1917. Service collected in advance	924.10
Providence Home Telephone Exchange, E. L. Isaacs, manager; Clay Home Telephone Exchange, C. E. Utley, manager: No balances on books December 31, 1917. Service collected in advance	23.71
Marion Home Telephone Exchange, W. T. Black, manager; Salem Home Telephone Exchange, W. T. Black, manager: No balances on books December 31, 1917, Service collected in advance	34.65
Smithland Home Telephone Exchange, G. C. Gish, manager: No balances on books December 31, 1917. Service collected in advance	44.81
Lawrenceburg Home Telephone Exchange, J. C. Head, manager: No balances on books December 31, 1917. Service collected in advance	16.59
Nicholas Home Telephone Co., W. C. Corman, manager: No balances on books December 31, 1917. Service collected in advance	1,385.95

I am not going to quote the balance of our plants, practically all of which had 100 per cent collections—for we are not satisfied with 100 per collections now. What we want is everything collected—not a dollar outstanding on the books. If anybody wants to pay in advance in addition to this, we are always glad to give them a receipt, although we do not push the advance collections.

These same plants which I have enumerated, not only finished January in just as good shape as they finished December 31, but they were in even better shape at the end of February.

I have no inclination to rub it in, but I do wish to emphasize the fact that *there is nothing which makes for good collections like good collections.* If we can once get an organization to appreciate just what it means, the work is accomplished, insofar as the general office is concerned.

Our managers are all 100 per cent collection managers now—but we are not satisfied with that. The goal for which we are now striving is to finish each year with a clean slate—that is, without a dollar outstanding. *It can be done and it has been done right along* for some time by a good many of our managers. It was done last year by the managers whose names are listed and I wish to assure you that a good part of the enthusiasm with which our men are fired is due to TELEPHONY, to Mr. Kelsey and to Mr. Edwards.

Every one of our plants made a nice increase in business during 1917, in addition to getting the money. Tell Mr. Schade to come again."

The entry lists are still open.

Mr. Brown certainly shows that the Central Home organization is imbued with an up-to-the-minute and a little-bit-ahead spirit which other telephone companies can well strive to cultivate.

Records like these are standards by which companies can judge of creditable work. Let us hear of it!

Annual Convention of Florida Telephone Association.

The eleventh annual meeting of the Florida Telephone Association was held in the auditorium of the chamber of commerce at Jacksonville, on Wednesday of last week, March 6. The address of welcome was delivered by F. C. Groover, president of the chamber of commerce. R. W. Storrs, of DeFuniak Springs, responded in behalf of the telephone men. This was followed by the annual address of the president, W. G. Brorein of Tampa.

Following the reports of the various committees the convention took up the discussion of how telephone employes can best serve the government, and the necessity of increasing the rates in the smaller exchanges in order that proper service may be maintained.

During the discussion of the first subject it was brought out that the government has used and is using the telephone systems of the country to good advantage during the present war. Orders have been sent to all parts of the country within a few hours.

Officers were elected for the ensuing year as follows: President, W. G. Brorein, of Tampa; vice-president, Dr. W. L. Moor, of Tallahassee, and secretary-treasurer, C. A. Prim, of DeFuniak Springs.

Iowa Association Plans for Big Convention Next Week.

Present indications point to a big attendance at the 23rd annual convention of the Iowa Independent Telephone Association which is to be held at the Chamberlain Hotel on Tuesday, Wednesday and Thursday of next week, March 19, 20 and 21. The serious problems confronting the telephone men are bringing them together for this meeting.

The main entertainment feature will be an athletic exhibition Wednesday evening. As a great many, if not most, of the telephone men have relatives or friends in training at Camp Dodge, they will take this opportunity to visit the camp.

The convention sessions will be held in the banquet room, the exhibits will be located on the fourth floor and the operators' school, which is to be held in connection with the convention, will be held on the parlor floor.

Final arrangements for the convention are being completed by Secretary Chas. C. Deering and the following program is scheduled to be carried out during the three days of the convention:

TUESDAY AFTERNOON.

Address of welcome by R. H. Faxon, secretary of the chamber of commerce.

Response by P. C. Holdoegel, Rockwell City.

President's address—J. H. Denkhoff, Dyersville.

Secretary-treasurer's report—Chas. C. Deering, Des Moines.

WEDNESDAY MORNING SESSION.

"The Railway Commission's Decision in the High Tension Case," H. L. Beyer, Grinnell.

Discussion of legal questions.

"The Signal Corps of Our Army," L. W. Ainsworth, major, 313th field signal battalion.

Patriotic address.

AFTERNOON SESSION.

Address by E. B. Fisher, Grand Rapids, Mich., chairman of the board of directors of the United States Independent Telephone Association.

"Modern Central Office Equipment," H. D. Currier, Chicago.

General discussion on the question of rates.

Question box.

THURSDAY MORNING SESSION.

"Small Exchange Economies," Chas. E. Guernsey, Schaller. This will open a meeting for the discussion of the many problems confronting the mutual and small company men—problems of construction, rising costs, directory and directory advertising, closing hours nights and Sundays, free service, etc.

AFTERNOON SESSION.

Unfinished business.

Election of officers and three members of the executive committee.

Sundry Snapshots Along the Trail

Observations and Comments, Pertinent and Otherwise, On the Sunshine and Shadows of Telephone Work

By Well Clay

The hour is the hour of dawn,
The season that of the snows,
Across the eastern horizon
A riot of color glows.

Orange and purple and saffron,
Crimson and red and gold,
Weaving a wonderful banner,
As the morning doth unfold.

Off to the west, cloud shrouded,
The skies are cold and gray,
With never a glint of gladness
To welcome the coming day.

The optimist turned to the morning,
Face all aglow with delight,
The pessimist looked only westward,
Still mourning the passing of night.

The main difference between the optimist and the pessimist is their attitude, because, if the pessimist would only turn around, he would soon become imbued with some of that enthusiasm of the optimist, and become one like him. A pessimist is not necessarily a pessimist all the while, any more than an optimist is free at all times of any disposition to have a "touch of the blues."

Sometimes the most confirmed optimist in the telephone game has moments when the multitude of later-day exactions, in the way of reports to the various commissions, oppress his otherwise hopeful demeanor, but, like pounding your thumb with a hammer, there are compensations for one feels such a relief after getting through with the pain.

In the place of having a clearing house for messages, I think necessity will soon compel telephone companies of the smaller towns to band together and form a clearing house for taking care of their reports to save the time of the managers for constructive and maintenance work in the conduct of their plants. We think, sometimes, there are too many laws but, as in the case of our own rules for the use of the telephone as printed in our directories, there seems to be need for each one and more if the public is to be educated.

As I said last week in closing, there are a few more rules than mentioned then which seem to me necessary for the conduct of the business.

In the calling of numbers, for instance, it has been found by most companies that each number should be spoken separately, as in 148. Instead of running the number together in the usual way by saying "hundred'n'fortycightplease," one should say "one, four, eight," except in the case of where a number has the last figure separated from the rest by a hyphen, to denote the ring, as in 36-2. One should then say "three, six, *call* two" in order that the number may not be confused with 362—another party entirely.

On country lines I find that a great many companies have in use the method of calling as follows:

Instead of calling for "five call two, rural," one calls for "two *on* five," which means that one wants that patron whose number is two short on line number five, rural. The "*on*" designates that it is a *rural line* instead of a *party line in the city*, which call would be "5-2" or "5 *call* 2."

This system works out fine and is easy to put into operation.

One of our subscribers, when asked the other day by a friend if he had a telephone, replied:

"Oh Ja, Ve got one of dem *ON* delephones."

This conveyed the intelligence that he was on a rural line and had a telephone on his farm.

Taking the receiver off the hook on a rural line is bad, but it does not work the harm that follows when a city patron's receiver, on a four-party harmonic line, is left off, when not in use. The latter ties up the line so that the other parties on the line cannot ring "Central," and makes a trip necessary, oftentimes, by the repairman. "*Never leave the receiver off the hook when not talking unless it be for a moment to hold the line while someone else is being called to the telephone*" is a good rule for common battery exchanges to have in their directories.

This covers the admonition about letting children fool with the telephone or taking off the receiver when no one is wanted. It is a bad practice and should be prohibited strictly.

Often in these days of rapid changes, one will only just get a telephone installed when some move on the part of the patron leaves one in the lurch with a "take out order" and a loss.

We have followed the rule, "No telephones will be installed for a less time than *one year* in the city and *three years* in the country," and making them sign a valid contract, on which you can sue if you have to, to cover the transaction.

I have heard it said that the ordinary contract, which is reproduced on this page, even when signed by both parties, is not binding unless one copy is given to the patron to keep as well as the one which the company retains for its files.

If such is the case, it would be well to bear this in mind when getting up your next "application for service" cards, which most of us consider valid contracts when signed.

Of course, one must have a rule which will enable him to collect enough in advance, if occasion requires, so that a patron, who is noted for being poor pay, will not order a telephone installed and then leave you with merely an addition to your accounts receivable. In this matter one must be careful for if he does not insist on collecting in advance from all, the odd patron can stand on his rights and demand according to the custom, no matter what your rules may say.

Patrons intending an absence from home for any considerable period, and wishing to retain their telephone numbers, as well as obviating the taking out and subsequent installing of the telephone again, can have the matter arranged by

APPLICATION FOR RURAL TELEPHONE SERVICE.

Application is hereby made to the HUTCHINSON TELEPHONE COMPANY for the installation of a telephone in my residence on Sec. ..... Township of ....., Minnesota; Said telephone to be on a rural party line connecting with exchange of said company. I hereby agree to pay for the same at the rate of $1.25 per month, quarterly in advance, and agree to keep and pay for said service at rate specified for a period of **three years** from the date of commencement of said service; and to pay for all toll messages originating from said telephone and to pay for all poles used in construction of a line across my farm from my residence to the rural line on the abutting highway; (said poles to be my property henceforth); and agree in case of discontinuance of service at the end of said period, or thereafter, to allow said company to remove the wires and other fixtures from said poles, if they so desire, without hindrance.

Unless written notice shall be given said company at least fifteen days before the expiration of this agreement, said agreement shall renew itself for a further period of one year and so continue upon each expiration until said notice is served as above.

This agreement shall be binding upon said company only when accepted and signed by its general manager.

Accepted and signed this ..... day of ....., 191..

....

Gen. Mgr. Applicant.

Contract for Telephone Service Which Rural Subscriber Signs.

giving notice beforehand of their intended absence and paying the sum of 50 cents per month for the time of their proposed absence, in advance. No absence of less than two months will be taken into account in such arrangements.

This would cut out the practice of demanding rebates when a patron is absent a week or so.

As the lady said when her husband began to snore, while she was giving him a lecture on having been out so late: "There is more to say on this subject than I have already mentioned, but it can wait over." Will mention a few lines later on the subject of "Non-subscribers" and other matters.

APHORISM: A step at a time covers the course at last.

Summary of Reports of 61 Class A Telephone Companies.

A summary of the reports of revenues and expenses of 61 Class A telephone companies for the month of November, 1917, and the 11 months ended with November was issued recently by the bureau of statistics of the Interstate Commerce Commission and is reproduced in the accompanying table. These companies had in service November 30, 1917, a total of 7,674,389 telephones, an increase of 603,776 instruments, or 8.5 per cent, over the preceding year.

The operating revenues for the month totaled $27,026,630, an increase of 8.5 per cent, while the operating expenses, $18,929,948, showed an increase of 16.4 per cent. The net telephone operating revenues, $8,096,682, showed a decrease of 6.3 per cent, while the operating income, $5,973,240, showed a decrease of 14.9 per cent.

The operating revenues for the 11 months ended with November totaled $290,758,326, an increase of 12.9 over the same period in the preceding year. The operating expenses amounted to $199,256,159, an increase of 17.8 per cent. The net operating revenues, $91,502,167, showed an increase of 3.4 per cent, while the operating income, $70,822,677, showed a decrease of 2.6 per cent.

Item.	For the month of November. 1917.	1916.	Increase (or decrease.) Amount.	Ratio. (Per cent.)	For the eleven months ending with November. 1917.	1916.	Increase (or decrease.) Amount.	Ratio. (Per cent.)
Number of company stations in service at end of month	7,674,389	7,070,613	603,776	8.5	.....	.....	.....	....
Revenues:								
Subscribers' station revenues	$17,446,326	$16,115,020	$1,331,306	8.3	$187,972,224	$169,108,108	$18,864,116	11.2
Public pay station revenues	1,433,030	1,269,944	163,086	12.8	15,164,494	13,361,152	1,803,342	13.5
Miscellaneous exchange service revenues	272,359	254,348	18,011	7.1	2,937,640	2,594,721	342,919	13.2
Message tolls	6,914,275	6,398,714	515,561	8.1	74,671,792	63,771,968	10,899,824	17.1
Miscellaneous toll line revenues	667,668	596,222	71,446	12.0	6,946,335	5,823,828	1,122,507	19.3
Sundry miscellaneous revenues	290,450	257,366	33,084	12.8	3,036,800	2,783,698	253,102	9.1
Licensee revenues—Cr.	1,025,766	939,105	86,661	9.2	10,963,677	9,700,012	1,263,665	13.0
Licensee revenues—Dr.	1,023,244	924,287	98,957	10.7	10,934,636	9,535,980	1,398,656	14.7
Telephone operating revenues	$27,026,630	$24,906,432	$2,120,198	8.5	$290,758,326	$257,607,507	$33,150,819	12.9
Expenses:								
Depreciation of plant and equipment	4,560,747	4,510,418	50,329	1.1	51,622,595	46,997,188	4,625,407	9.8
All other maintenance	3,915,317	3,285,817	629,500	19.2	40,891,420	34,421,355	6,470,065	18.8
Traffic expenses	6,550,715	4,984,785	1,565,930	31.4	64,969,253	51,281,831	13,687,422	26.7
Commercial expenses	2,568,971	2,371,521	197,450	8.3	27,901,203	24,928,598	2,972,605	11.9
General and miscellaneous expenses	1,334,198	1,114,399	219,799	19.7	13,871,688	11,487,052	2,384,636	20.8
Telephone operating expenses	$18,929,948	$16,266,940	$2,663,008	16.4	$199,256,159	$169,116,024	$30,140,135	17.8
Net telephone operating revenues	8,096,682	8,639,492	*542,810	*6.3	91,502,167	88,491,483	3,010,684	3.4
Other operating revenues	1,253	1,226	27	2.2	14,097	13,336	761	5.7
Other operating expenses	1,806	1,227	579	47.2	14,597	14,038	559	4.0
Uncollectible operating revenues	108,040	133,319	*25,279	*19.0	1,380,579	1,518,748	*138,169	*9.1
Taxes assignable to operations	2,014,849	1,490,451	524,398	35.2	19,298,411	14,294,789	5,003,622	35.0
Operating income	$5,973,240	$7,015,721	*$1,042,481	*14.9	$70,822,677	$72,677,244	*$1,854,567	*2.6

*Decrease.

Interstate Commerce Commission's Summary of Earnings and Expenses of Class A Companies for November.

Civil Service Examinations for Telephone Men.

The Interstate Commerce Commission has announced an open competitive examination for examiner of accounts for telephone and telegraph service. Two grades of eligibles will be established, the salaries in the first grade ranging from $2,200 to $3,000 a year and the second grade from $1,800 to $2,100. Competitors will not report for examination but will be rated according to education, training, experience and fitness.

An open competitive examination is also announced for junior telephone and telegraph engineer, the salaries ranging from $720 to $1,200 and the ratings being made according to education, training and experience.

Those desiring to compete for these positions should apply for Form 2039, to the Civil Service Commission at Washington, D. C., or any branch office, stating the title of the examination desired.

City Gets Gross Receipts Tax from Chicago Telephone Co.

The city of Chicago has just received a check for $300,494 from the Chicago Telephone Co. which represents 3 per cent of the company's gross receipts for all business within the city for the six months ended December 31, 1917. The gross receipts for the period were $10,016,476.

Annual Meeting of Michigan Traffic Association.

The net increase of 6 per cent in the business of the Michigan Independent Telephone & Traffic Association was reported for the last six months in 1917 at the annual meeting held recently in Grand Rapids.

Roy F. Mapes, who was elected secretary and treasurer, was the only officer named who was not re-elected. The other officers are: President, C. E. Tarte, Grand Rapids; vice-president, W. J. Melchers, Owosso.

The board of directors includes C. E. Tarte, W. J. Melchers, W. A. Bahlke, R. C. Smith, L. L. Conn, Thomas Bromley, Jr., A. E. Wells, N. F. Wing, W. B. Serviss, J. P. Gibbs, C. E. Smith, Roy F. Mapes, C. G. Fitzsimmons, A. H. McMillan and G. L. Hall.

Practical Subjects—Discussions

Questions Answered Regarding Automobile Expenses.

Shortly after the first of the year, W. M. Brown, general auditor of the Central Home Telephone & Telegraph Co., Louisville, Ky., received this letter from the San Angelo Telephone Co., San Angelo, Texas:

"In one of the April issues of TELEPHONY last year I noticed that you had made a specialty of automobile expense in connection with the telephone game.

May I ask if you have a paper on the subject that I could read, where I could get enlightenment on such points as: The depreciation of cars and motorcycles; the annual or monthly distribution of account No. 702; the relation of casings and tubes to fixed capital?

As you probably know, these are the kind of questions that are coming up very often, and it is difficult sometimes, and also foolish to come to conclusions without finding out what the other fellow is doing.

I shall be very grateful to you if you can put me on to anything such as I have mentioned."

In response to this request, Mr. Brown told of the practices of the Central Home company relative to the points raised, as follows:

"Several years ago when the cost of cars was higher than it is now, we set aside $180 per year for the depreciation of Ford runabouts. Since the price has been reduced, we have set aside $120 a year for runabouts and $180 a year for converted Ford trucks.

These charges are, of course, made monthly and we have found that an accumulation on this basis is sufficient to pay the difference between our wornout cars and new ones when we trade the old ones in.

We endeavor to carry out the instructions of the Interstate Commerce Commission to the letter on the distribution of Account No. 702, stable and garage expense. In distributing any clearing account, it is sometimes necessary to make estimates. However, what we actually do is to require the employes who use our machines to keep an actual daily mileage record. In other words, when a man turns in his time on a work report for the day, if he has used an automobile, he shows the total number of miles used. In addition to this, he shows the number of miles used on each job or class of work.

A monthly tabulation of these figures gives us the monthly distribution, and this is the basis on which we are making the distribution for the expense each month of operating each of our cars.

For practical purposes, I can not see that there is any sort of a relationship between casings and tubes and the fixed capital accounts. What we actually do when we purchase automobile supplies in large amounts, is to charge Account 122, Materials and Supplies. When it is used it is charged to Garage Expense Account.

We found that it was very hard in the beginning to get reliable records of the use of our automobiles, but by constant hammering, we have been able to get things shaped up so that the records are of great assistance to us."

Nature Puts the Telephone Drop Wires to An Icicle Test.

By Felix J. Koch.

These are the days of mechanical efficiency, above all things, and public service corporations, of all others, delight in showing to their patrons—and to others, they'd attract, beside—how absolutely near-perfect are all materials used in rendering what service is given. But it's not often that old Dame Nature takes a hand

The Icicle on Drop Wire.

and gives the advertising a boost along such lines in the fashion which is pictured in the accompanying illustration.

Cincinnati, along with most the Mid-West portion of the big republic, has just come out of what is, without doubt, the most severe winter in her history. Coal shortages, with their "heatless days" and "skip-stop" arrangements on the cars, did no little to aggravate the sufferings come of the actual cold.

Only, true to the ancient axiom that "behind the clouds the sun's still shining," every so often a peep of Old Sol would serve to brighten all things living in this part of the icebound earth. That sunshine, too, served to melt—just a very, very little—some of the ice that hung, like edgings of a blanket, over the eaves of houses.

On the houses shown by the picture, located on Hearne Ave., in Avondale—a residential district of Cincinnati—some of this melting occurred in such manner as to make the water trickle to a stated point, and there proceed to fall. In falling, however, by merest chance it came squarely in the path of a telephone wire running from a professional man's second-story office to the main lines along the street.

The water melted, drop on drop—the drop fell on the wire. There it stopped and there it froze—for the place was well-exposed and very cold. Slowly, surely—as in the making of the stalactites in the Mammoth and other caves—another drop came down, hitting squarely on this. It fell, it scattered, its bits clung to the iced predecessor of just before and it froze on this, in turn.

Then another and another and another such drop, each leaving in its wake a mass of ice larger than before. By and by that stray, cold sun took hold of this, let it melt a wee, wee bit, and so gave it the icicle shape.

Howsoever, that icicle grew, grew and grew, till it caught the eye of all passers-by. That the wire should support it, without snapping, or that it should not fall, of own weight, did seem well-nigh incomprehensible. Whatsoever, the icicle held on, and no end of folks stopped on their way to see. Then, finally, the first real thaw—a loosening of the bonds—and down it crashed, to destruction, below.

Just what it weighed, of course, is uncertain. Whatsoever, it was some heavy strider, but, at that, the wire held it, nor was service in the least affected by the curious and unwonted strain.

Annual Report of the Johnstown (Pa.) Telephone Co.

The annual report of the Johnstown Telephone Co., of Johnstown, Pa., shows a net increase of 719 stations during the year, making a total of 9,294 telephones in service on January 1, 1918.

The total income for the year was $231,074 and the disbursements, $198,700, leaving a balance of $32,374. Deducting appropriations for accrued taxes, not due, and interest on bonds left surplus earnings of $6,201. The total assets were $1,152,340 and the total liabilities, $1,135,100, leaving an unappropriated surplus of $17,240.

Figuring the Power Plant.

(Continued from page 24.)

pen to this one source of power—say the city light and power circuit. Anything might happen to a small town power supply to interrupt the service for several days—not likely, perhaps, but eminently possible. The failure of your own machine might also occur. And the lack of charging current will mean that the battery will run down from continuous use until it is discharged beyond redemption.

An emergency charging set, driven by a gas or gasoline motor is the first thought and might be provided for such an emergency. A duplicate set of batteries might be installed, but that would be expensive. If there are two sources of power available, the regular lighting service, and a 500-volt street car circuit, the latter might be used to drive an extra motor-generator, though the use of such a voltage for this purpose is forbidden in some places.

To be on the safe side from such interruptions of service, we may install a battery of sufficient capacity for a two or three-day supply—a 48 or 72-hour battery. Where such a battery will not be over 1,000 ampere-hours' capacity, it is probably as economical in the long run as the installation of an emergency charging set.

The initial expense is the only serious factor to be considered and we have intimated that this is about the same as for an emergency set under certain conditions. It will, of course, be larger than for the usual 24-hour battery and will require a larger charging set, but instead of charging every day, the charge will be made every two or three days, and the monthly bill for kilowatts will remain the same.

In this case, if we adopt the 72-hour battery basis, the cells will have to be of 612 amperes' capacity, and as we do not find any listed of that size we will take the next larger, or those of 640 ampere-hours. This is well below the 1,000-ampere capacity. The charging rate we note to be approximately 80 amperes.

But the requirements for 1917 are initial. Referring to Table III we find that with the increased requirements of 1922 we will need, for a 72-hour supply, a battery with a capacity of 720 ampere-hours with a charging rate of 90 amperes; in 1927, of 880 ampere-hours, with a charging rate of 106 amperes, and in 1932 a battery of 960 ampere-hours with a charging rate of 118 amperes.

Initial Set-Up of Power Plant.

In choosing the initial set-up of a power plant, we must consider these future requirements in more ways than one. It would be obviously poor policy to install tanks or jars for our immediate needs and have to replace them in a few years on account of their being too small to permit of additional plates being added. It would be equally poor judgment to install wood tanks of sufficient size to care for the requirements of the 1932 period, for the life of such a tank is not an insurable proposition after eight or ten years of service. But if we are not to install a battery and power plant of this size initially, they are a matter of future requirements and floor space must be allowed for them.

Size of Battery Room.

The battery room must be large enough to provide adequate space for the eventual installation of these tanks, and the conduties, battery panel, and possibly the power leads, should be figured on the basis of these future requirements. The extra weight of copper involved by their initial installation would probably be offset by the cost of a later removal and replacement with heavier leads.

With this in mind, we will arrange to install all permanent fixtures, conduits, etc., to agree with future needs, but will not look so far ahead with the battery itself. With the charging equipment we have to make a choice between two 50-ampere rectifiers connected in multiple, a motor-generator, or an engine-driven charging set.

The rectifiers will cover our requirements up to 1927, when a third might be added if the overload capacity is not sufficient to cover the 106 amperes required at that time. The over-load capacity of a rectifier is slight. If a motor-generator or engine-driven set is to be used, there will be no question as to the advisability of the initial installation of machines to care for the ultimate, for the difference between the initial and later demands are so slight as to prove no economy in considering a later replacement.

With this in mind, the power computations indicate that for a 72-hour supply battery we should make our initial power installation as follows:

Tanks for an 880-ampere-hour battery.

Elements for a 720-ampere-hour battery.

2 50-ampere rectifiers, connected in multiple, or

1 120-ampere charging set.

If the 72-hour supply battery is not desired, the initial installation would be:

Tanks for a 320-ampere-hour battery.

Elements for a 280-ampere-hour battery.

1 50-ampere rectifier.

1 emergency charging set of similar capacity.

For a battery of this latter size, jars would be used instead of tanks, and it would be a decided economy to install them of sufficient size to care for the ultimate requirements, or for a 400-ampere-hour battery, for barring accidental breakage, the glass jars will suffer no deterioration.

The 50-ampere rectifier is indicated instead of one of 30 amperes, as it will cost but little more and will not have to be replaced in a few years' time by one of greater output.

In some telephone systems 48 volts are used for the talking circuits of the toll board and for private branch exchange service. For this purpose a secondary 24-volt battery is used, working in series with the regular 24-volt central office battery to give the 48-volt potential.

This battery is usually of small size in comparison with the main battery, for the current consumption is restricted to a limited use. When such a battery is used, it is charged from the same machine used for the large battery or by a separate charging set, usually a small rectifier. It may be figured on a 48 or 72-hour supply basis, but as it is poor policy to install a very small storage battery for central office use, the type that is installed is ordinarily large enough to provide several days' supply without special consideration.

Besides being used for the toll circuits and private exchange service, this battery may be used to drive the ringing machine motor and thus be kept in a more active, and consequently healthy, condition than if used for its primary object alone. If to be used for this purpose, it is advisable to see that it is of sufficient capacity for this requirement in addition to its regular use.

In laying out a power plant there are a great many points to consider. We have seen that if a battery room is allowed for the storage cells, it must be of ample size for all future growth. If the battery consists of small jars, say up to 300 ampere-hours, a double-decked rack may be used. In such a case a cabinet may enclose the rack with a proper vent to the outer air and a separate room will not be required.

Arrangement of Tanks.

If tanks are used, they should not be put upon such a rack, but on, and insulated from, a trestle or pedestals. The use of pedestals of proper height will permit of the tank being supported while the pedestal is removed, and the tank may then be lowered to be cleaned or repaired, with the elements supported in the air by their busbars, and "jumpered" to prevent interruption of service when the electolyte is withdrawn.

The tanks may be ranged in one row against a wall, but with large cells it is most advisable to permit of access to both sides. If they are arranged in a double row, such access and removal space is imperative, and should exceed the dimension of the largest tank. If a secondary set of small batteries is installed, it may be mounted on a pier or upon a double-shelf rack in the battery room.

The "live" side of the battery should be closest to the point of battery distribution, for the lead to this point will often carry both the charge and discharge current and induction from the charging machines may be disagreeably apparent if by undue length or light weight of copper, an insufficient capacity obtains in this portion of the power circuit.

The weight of the battery must be considered and may be secured from the catalogs. For example, the weight of one cell (wood tank) of an 800-ampere-hour battery is close to 500 pounds, and the 11 cells of such a 24-volt battery will weigh 5,500 pounds. If this weight is spread out over the space occupied by 11 cells in a row, it will be a less concentrated amount than if the cells were arranged in two rows of six and five each. These things must be considered seriously if a battery room is located, say, on the second floor of a frame building.

The power board is required by the insurance companies to be a certain distance from the wall, as are rectifiers, protection panels for entrance wires, etc. The motor-generator set, if one is used, must be so located that the armature of either machine may be easily removed. If a gas engine is used in conjunction with a charging machine, there must be a proper clearance about it to minimize the danger of accidents to employes. To obtain a minimum of conduit run, the power and battery equipment must be grouped accordingly.

If the company is so unfortunately situated as to make use of 500-volt motor service, it should see that all possible precautions are taken to safeguard employes. There should be ample space behind the power board that attendants may go there without looking death in the face. The writer has a case in mind where a plea for rubber mats about a 500-volt switch panel and motors was refused by the general manager of the company on the ground that such a safeguard would tend "to make the men careless"—and this equipment was in semi-basements with concrete floors! Would that we could solve some mental processes!

Tables or stands upon which ringing machines are located, should be so placed as to admit of plenty of light, by day and night, that minor repairs or adjustments may be quickly made. Where the switches for control of this apparatus are on the power board, the machines should be within sight, if not of easy access, that the failure of a motor to start, or any visible trouble, may be noted before the other machine is switched over and the current taken from the switchboard.

Duplicate fuses of all the important power circuits should be always of easy access, with wrenches or screw drivers kept in a certain place for this special purpose. If a main discharge fuse goes "out," the sooner it is replaced the better for all concerned. A shunt relay arranged to operate and give an alarm for this purpose may save many anxious moments.

The power plant may be considered a nuisance, and its component parts to be in the way, but without it there would be nothing to make the switchboard operative. A few hours' consideration of its requirements when a new building is under discussion, will prove time well spent and will result in a very material benefit to all concerned.

Biographical and Personal Notes

E. B. Couch, who was formerly manager for the Gulf States Telephone Co. at Hico and Groesbeck, Texas, but who has recently been on the sick list for the past several months, has regained his health and is now installed as manager of the San Angelo Telephone Co.'s exchange at Mertzon, Texas.

W. N. McAnge, Jr., vice-president and general manager of the Allen Properties, Corinth, Miss., is taking a much needed rest at Chimney Rock, Wytheville, Va.

M. Barratt, former manager of the Lincoln Telephone & Telegraph Co. at Sutton, Neb., has enlisted in the aviation service.

F. W. Kennedy has been named as manager of the Sutton exchange of the Lincoln (Neb.) Telephone & Telegraph Co.

Alpheus Hoover, secretary of the Canadian Independent Telephone Association, and president of the York & Ontario Independent Telephone Union, of Green River, Ontario, is a native of that town, where his arrival in this world was recorded some 52 years ago. Mr. Hoover succeeded his father in the milling business and his first venture in the telephone business was in the construction of telephone lines between his mill towns and the railway and market towns in 1903.

During the Sir William Murlock postmaster general investigation, Mr. Hoover testified to having 20 telephones, and from this small beginning he has built up a system with over 1,000 telephones.

He was the organizer of the York & Ontario Telephone Union, of which he is now president. Among the member companies of this union are the Home Telephone Co. Ltd., Bethesda & Stouffville Telephone Co. Ltd., Scarborough Telephone Co. Ltd., Mount Albert Telephone Co. Ltd., Uxbridge & Scott Telephone Co. Ltd., Canadian Independent Telephone Co., of East Toronto, and the King Telephone Co. Ltd.

Alpheus Hoover.

He organized many of the Independent telephone companies in Ontario and was one of the experts called in the government investigation in the government provinces. As vice-president of the Canadian Independent Telephone Association for several terms, he has taken an active part in the affairs of that body. He is a member of the Masonic, Odd Fellow and United Woodmen orders.

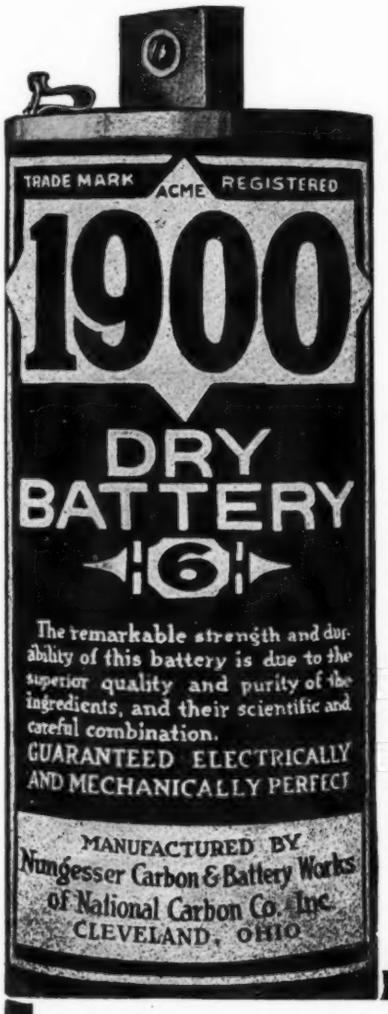
Mr. Hoover is of an active disposition, earnest, sincere and sympathetic in his manner and a "sticker" once he starts on a thing. Being of a practical nature, methodical in his reasoning, and a good judge of values, Mr. Hoover's exchanges are undoubtedly successfully managed.

Frank L. Beam, of Columbus, Ohio, president of the Ohio Independent Telephone Association, and active vice-president of the Ohio State Telephone Co., is well known among Independent telephone men, especially in the Middle West.

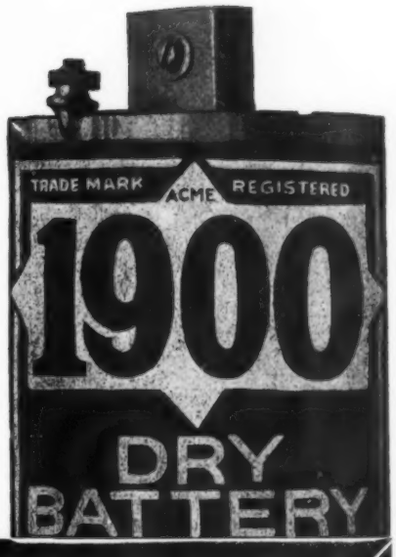
He was born November 14, 1858, near Mt. Vernon, Ohio, where he grew to manhood. After receiving his education in the local schools, he began his business career as a clerk in a hardware store in Mt. Vernon. In 1880 he engaged in the crockery and wall paper business there, which he continued successfully until 1901.

In 1880 he became interested in the Independent telephone business. He has been president of the Mt. Vernon Telephone Co. since its organization and its great success has been due largely to his efforts. During this period Mr. Beam also became interested in and helped to organize many Independent telephone

ACME 1900
SPECIAL PHONE CELLS


TRADE MARK
ACME
REGISTERED
1900
DRY
BATTERY
6
The remarkable strength and durability of this battery is due to the superior quality and purity of the ingredients, and their scientific and careful combination.
GUARANTEED ELECTRICALLY AND MECHANICALLY PERFECT
MANUFACTURED BY
Nungesser Carbon & Battery Works
of National Carbon Co. Inc.
CLEVELAND, OHIO

"Acme 1900's" are offered in two types. For low amperage batteries specify "Acme 1900 SPECIAL PHONE CELLS." Otherwise the higher-test type will be supplied. Mention if you desire Fahnestock Spring Clips.



"Save By Spending"

Your operating costs have risen. Your rates have not. You are striving to save in many new ways.

Do not blind yourself to the economy of quality. Do not save at the spigot to lose at the bung-hole.

Cheap dry cells may save a trifle to commence. But their earlier renewal and the attention they occasion convert wee savings into deficits. For labor is costliest.

Acme 1900's are economical to use—measured by the final reckoning of labor and materials divided by years.

They are the heritage of 29 years' dry battery specialization. Their uniformity results from this wealth of experience. Their long-lasting, trouble-free characteristics are traditional among telephone users.

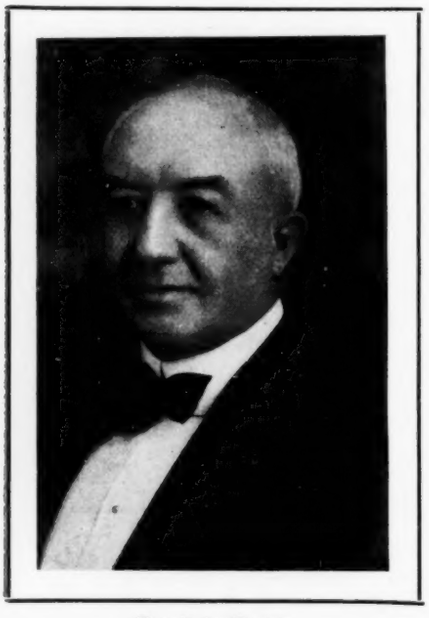
Write "Acme 1900's" (see instructions above) upon your next order. If your jobber is not stocked, please write us.

The National Carbon Company, Inc., Cleveland, Ohio

companies in other counties of the state which are today most successful companies.

He became general manager of the Columbus Citizens Telephone Co., of Columbus, Ohio, in 1899, which position he retained for a period of six years. In 1904 he was elected president of the Ohio Independent Telephone Association, which office he has held continuously since that time. On account of the duties connected with the state association work, he resigned as general manager of the Columbus Citizens Telephone Co. in 1905.

Mr. Beam has just recently been elected one of the active vice-presidents of the Ohio State Telephone Co., with general offices at Columbus, and consequently at present is devoting considerable of his attention to that company. He has



Frank L. Beam.

mastered thoroughly every phase of the telephone business and is by nature an organizer and promoter, carrying to successful completion whatever he undertakes. The Ohio Independent Telephone Association ranks as one of the leading Independent associations and its strength is due largely to the spirit injected into it through the capable efforts of "Frank," as he is known to all Ohio telephone men.

He has also been active in the organization and promotion of the Coshocton Gas Co. and the United States Roofing Tile Co., operating plants at East Sparta, Ohio, and Parkersburg, W. Va. These companies are doing a large and constantly growing business.

Fraternally, Mr. Beam is a Mason, holding membership in all the branches of the order. Politically, he is a Republican, and he and his family are members of the Presbyterian church.

P. C. Staples, for over seven years publicity manager for the Bell Telephone Co. of Pennsylvania, has been promoted to the position of division manager, with headquarters at Pittsburgh, Pa.

Walter B. Clarkson, for the past ten years associated with the Bell Telephone Co. of Pennsylvania in various capacities, and since 1910 division manager at Pittsburgh, has been made general commercial superintendent of the Chesapeake & Potomac Telephone Co.

John E. Boisseau, publicity manager for the Chesapeake & Potomac Telephone Co., of Baltimore, Md., for the last six years, has been appointed publicity manager of the Bell Telephone Co. of Pennsylvania and associated companies, with headquarters in Philadelphia. He succeeds P. C. Staples.

Geo. H. Fulmer, manager of the Indiana, Pa., office of the Bell Telephone Co. of Pennsylvania for the last five years, has been made manager of the Johnstown district, which includes 16 exchanges, with headquarters in Johnstown.

Jesse F. Smith, secretary and general manager of the Harrison & Jefferson Telephone Co., Cadiz, Ohio, is a native of that state. He was born in Green township, Harrison county, December 31, 1881, and his public school education was supplemented by a course in telephone engineering at the International Correspondence School.

His first experience in the telephone field was with the Bell company in May, 1901. From May, 1902, until June, 1905, he was employed by the Harrison County Telephone Co. as troubleman. He was then promoted to manager of the company, in which capacity he continued until April, 1909.

At this time a number of Independent companies in Harrison, Jefferson and Belmont counties were consolidated under the name of the Harrison & Jefferson Telephone Co., with a capital stock of $250,000. Mr. Smith was made secre-

Jesse F. Smith.

tary of the consolidated company and in July, 1912, he was made general manager of the properties, in addition to his duties as secretary.

Ask Mr. Smith's associates what are his leading characteristics and they would undoubtedly say: "Stick-to-it-iveness, ability to work hard, earnestness, patience, real ability to figure out a logical and practical solution of a problem, and a sympathetic understanding of the other fellow."

Mr. Smith is past master of Harrison Lodge, No. 219, F. and A. M., and chairman of the board of public affairs of Cadiz.

From Factory and Salesroom

Convention: Iowa, Des Moines, March 19-21

Demand for Semi-Trailers Said to Be Increasing.

"The demand for semi-trailers is increasing daily—even exceeding the expectations of the most optimistic members of our organization," asserts August C. Fruehauf, president of the Fruehauf Trailer Co. of Detroit, Mich., who recently returned from a trip through the Southwest where he closed contracts for trailers worth $32,000.

Mr. Fruehauf, who established his business 20 years ago and now claims the largest semi-trailer manufacturing plant in the world, declares that thousands of trailers will be sold in the oil fields during the next few years. He has designed a semi-trailer to facilitate the handling of heavy pipe. It is of the extension type and accommodates varying pipe.

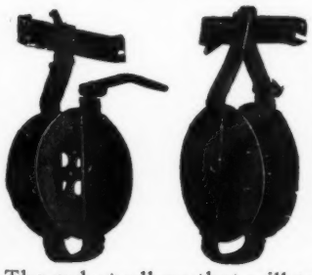
Mr. Fruehauf is solving transportation problems in various lines of industry. Recently he was successful in reducing the cost of hauling cotton 70 per cent and later constructed a semi-trailer of special design which is being used to transport coal from a mine to Pittsburgh.

Johns-Manville Co. Housed in Its New St. Louis Branch.

January saw the St. Louis branch of the H. W. Johns-Manville Co. comfortably installed in its new building on the southeast corner of Olive and Eleventh streets. The six-story edifice of modern fireproof construction throughout, is a

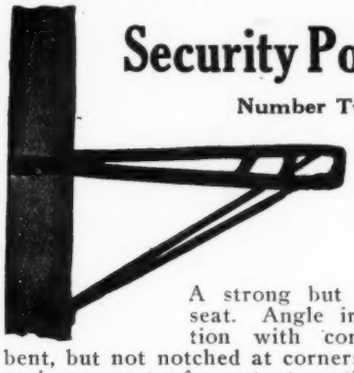
SECURITY SPECIALTIES

that you will need for your Spring Pole Line Work



Security Cable Trolleys

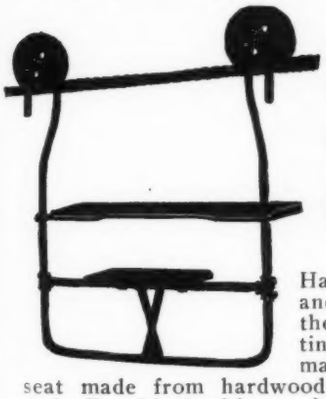
The only trolleys that will take any size cable and release it. Easily attached. Simplest design. Cannot tilt or come loose from strand. No parts to break. Made in two sizes.



Security Pole Seat

Number Two

A strong but light weight seat. Angle iron construction with continuous rim bent, but not notched at corners, thereby insuring a seat of great strength and safety coupled with neat appearance. Galvanized.



Security Cable Car No. 1

Has adjustable seat and pipes forming the frame are continuous. Rollers of malleable iron, and seat made from hardwood with dovetailed end. Furnished with or without table.

Write for Security Bulletin No. 6 also our Price List

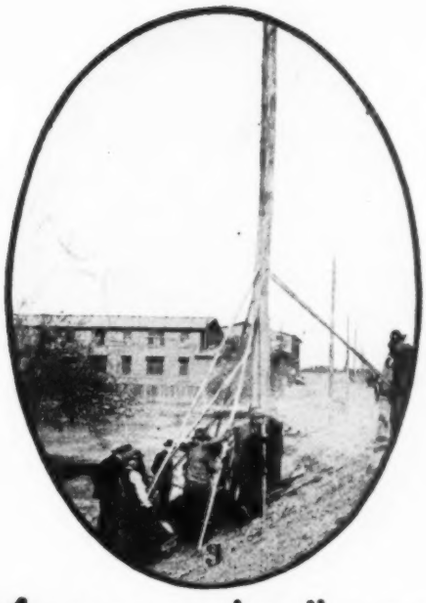
The F. Bissell Company

226-228-230 Huron Street

TOLEDO, OHIO

TOLEDO, OHIO — THE F. BISSELL COMPANY — TRADE MARK

TOLEDO, OHIO — THE F. BISSELL COMPANY — TRADE MARK



"More poles" per day can be set with OSHKOSH Pike Poles

because you are seldom if ever delayed by broken pikes and a consequent shortage of them.

OSHKOSH PIKE POLES are made to stand the heavy work of setting pole lines. All the poles are made of carefully selected, straight grained Douglass or Western Fir. This timber has proved ideal for the purpose, as it is nearly as strong as oak, yet light in weight, so that your men can handle even the longer ones without difficulty.

For this reason, OSHKOSH PIKE POLES will be greatly appreciated by the men, and will enable them to get more work done in a given time.

OSHKOSH Cant Hooks—Peavies—Reels—Tamping Bars—Pole Supports—and other construction tools are also made to adequately serve the purpose intended, and to stand up under hard usage.

Investigate the OSHKOSH line. Write today for our catalogue, and the name of your nearest jobber.

OSHKOSH MFG. COMPANY

OSHKOSH, WIS.

worthy addition to the retail district of St. Louis.

The new building, with a 55-foot front on Olive street and 109 feet on Eleventh, has six floors and basement, and is equipped with separate elevators for passenger and freight service. Wherever practicable, Johns-Manville products were used in the finishing of the building, including mastic floors, asbestos wood partitions and a Johns-Manville asbestos roof.

The show room, 55 by 72 feet, with the entire front and side of glass, a view of which is shown in the accompanying illustration, is the feature of the new establishment. One hundred and twenty-two running feet of show windows afford an unusual opportunity for the display of the entire Johns-Manville line. To supplement the show cases, five kiosks have been built in the rear of the show room to demonstrate the proper roofings to be used on various surfaces and the correct application of the different materials.

New Johns-Manville Building in St. Louis.

This practical demonstration of Johns-Manville roofings has attracted much favorable attention from the many callers.

Back of the show room on the ground floor is the shipping room and the well-equipped automobile service department which has a separate entrance on Eleventh street.

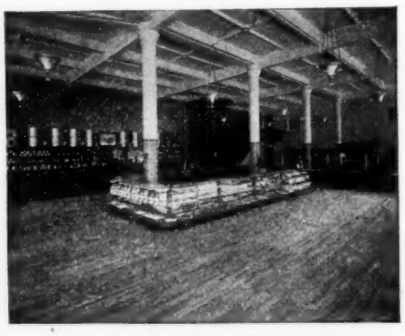
The manager's office and all selling departments' offices occupy the second floor, where is also the men's locker room, equipped with the latest sanitary steel lockers.

On the third floor are the accounting department, the stenographers and the purchasing and traffic department. A comfortable rest room for women, and the women's lockers are also on this floor.

The fourth floor is taken up by stocks of materials handled by the power plant specialties and electrical departments with enclosed storage rooms for the proper care of stationery, samples and printed matter. Provision is also made, on this floor, for storage of mill board, and a stock of the articles handled by the automobile accessories department.

The fifth floor is devoted entirely to pipe covering.

The north end of the top floor, with



A Corner of the Main Floor Show-Room.

glass on the whole north and west sides, is given to the Gasket manufacturing department. This arrangement gives an abundance of daylight with the least glare, which contributes greatly to the efficiency of the workers.

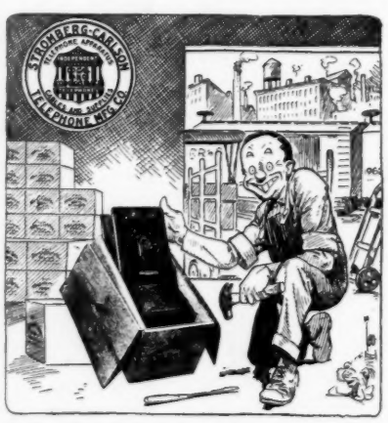
The balance of this floor is occupied by the construction department and stock room for Keystone hair insulator, hair felt and other floor and wall insulations.

The basement is used for the storing of roofing, asphalt, high temperature cement, asbestos wood, asbestos cement, roof coatings and other roofing accessories in the well-known Johns-Manville line.

All parts of the building are exceptionally light and well ventilated, and the employes can work under the most favorable conditions. It is a fitting housing for the St. Louis branch of the great Johns-Manville organization which "covers the continent."

Phoney Bill Visits the Company's Shipping Department.

Nothing delights Phoney Bill more than getting out into the shipping depart-

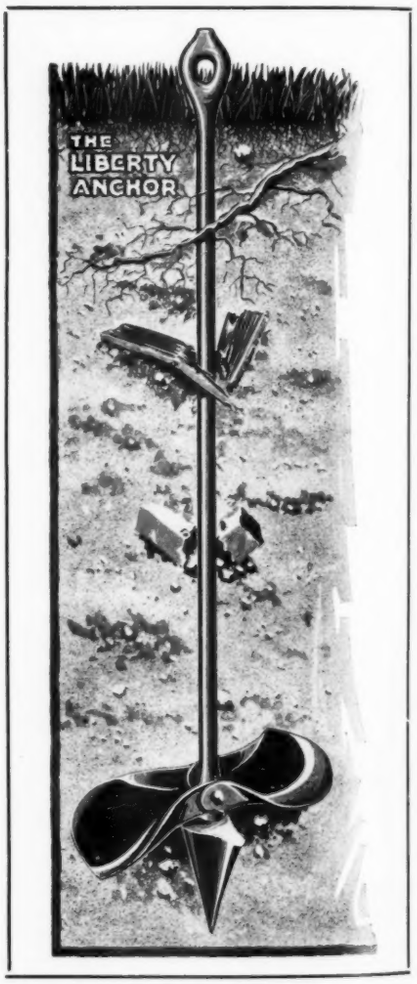


"The New '896' Comes to You Fully Assembled."

ment and helping to pack the finished products of the "Quality Apparatus" factory. The March blotter calendar of the Stromberg-Carlson Telephone Mfg. Co. shows Phoney Bill carefully packing a new No. 896 wall telephone for shipment to some satisfied customer or, perhaps, to someone who has learned of the merits of "Quality Apparatus." "The new '896' comes to you fully assembled" is his comment.

The "Liberty" Anchor of the Gund Mfg. Co.

The Gund Mfg. Co., of La Crosse, Wis., announces the addition of a new



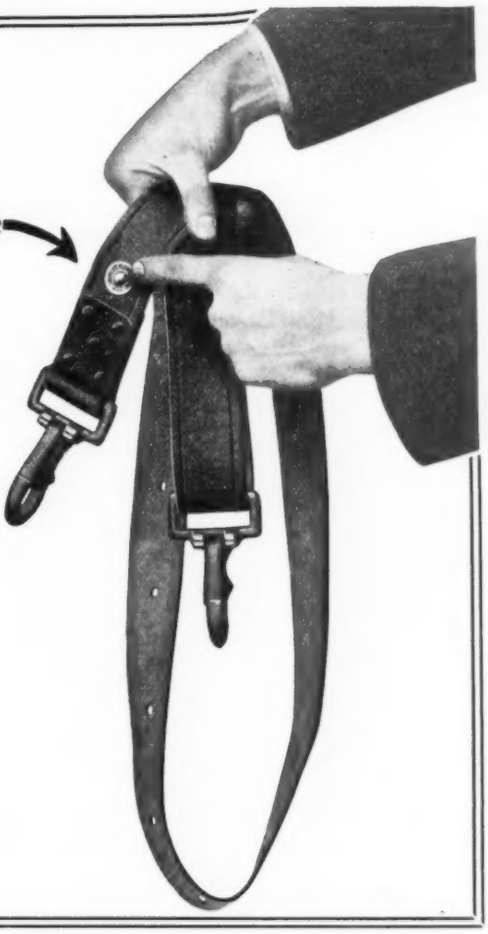
The New "Liberty" Anchor.

model anchor to its present line. It is to be known as the "Liberty" anchor.

In general appearance this anchor is very much like the present Drive & Twist anchor made by the Gund Mfg. Co., but it is much heavier and stronger throughout. It was at first designed exclusively for government use but is now being made in very large quantities and offered to all telephone companies.

The shaft, eye and point on the "Liberty" anchor are drop forged from one solid piece of steel. There are no joints. The rod is an inch thick and is made of open-hearth steel. The extreme thickness of this rod, together with the rust-resisting qualities of the material used, make the anchor practically immune from any rusting dangers. Even so, the manu-

Don't Take Chances!



The Name

"Mathias Klein & Sons"

on Safety Straps and Belts means they are SAFE!

(Look for the Name)

We can make IMMEDIATE SHIPMENT of leather goods — belts, safety straps, climber straps, tool bags, etc.

The name, Mathias Klein & Sons, coupled to leather goods for linemen and electricians means the same assurance of quality and trustworthiness as it does in connection with tools.

Don't Forget—Our Complete Illustrated Catalog Awaits Your Request.

MATHIAS KLEIN & SONS, Tool Mfrs.

Canal Station 34, Chicago

Trouble Detectives!

PIGNOLET Portable Testing Meters will locate any kind of trouble besides measuring volts and amperes; will also determine resistance of coils, lines, ringers, etc.

VOLTMETERS
AMMETERS
VOLT-AMMETERS

Suppose you let us send you a copy of the PIGNOLET Catalogue. It's worth while.

L. M. PIGNOLET

80 Cortlandt Street New York

Medal Panama-Pacific International Exposition

McROY CAMP CONDUITS

Salt-glazed · Burned Clay

The standard for efficiency

send for handbook on electrical conduits

NATIONAL FIREPROOFING COMPANY
Pittsburgh
Pa.

facturers are carefully treating the Liberty anchor with a hot-dip asphaltum process which further protects it.

The spear-shaped point is made extra strong so that it readily penetrates anything in its path. It is very sharp and makes a perfect pilot for the blade and rods which follow.

The blades are heavy and wide. They have a spread of 12 inches and are set at a slightly inclined angle. They are carefully sharpened to a knife edge which makes opening very easy. Like all other Drive & Twist anchors, it is installed by being driven down with a sledge and then twisted three revolutions to the right. The accompanying illustration shows how the "Liberty Anchor" looks in the ground after being completely installed.

The Gund Mfg. Co. has installed the most modern type of anchor machinery which facilitates economical production. It is offering the Liberty anchor at a very much reduced price made possible by large quantity output and reduced shop costs.

Kinloch Exchange Equipment and the Kellogg.

The Kellogg Switchboard & Supply Co. has prepared for distribution to Independent men an eight-page picture booklet showing various exchange views of the Kinloch Telephone Co. of St. Louis, St. Louis is of special interest to the Independent telephone man because it was there that the first large Independent multiple switchboard was installed. It was built and installed by the Kellogg company in 1898 and is, after 20 years of constant usage, still giving excellent service and will, it is predicted, continue to do so for many years to come.

This is certainly a great achievement for this board was built without precedent or previous experience in this line. The building of this board, in fact, stands out as a prominent point in the history of telephony.

The Kellogg booklet shows the board as it is today, and as it was just after installation, in actual service—strong testimony of the Kellogg slogan, "Use Is The Test."

A copy of this booklet may be had for the asking from the Kellogg Switchboard & Supply Co., Chicago.

Electrose Mfg. Co. Increases Its Plant Facilities.

The Electrose Mfg. Co., of Brooklyn, N. Y., has enlarged its plant to take care of its increasing volume of business.

Louis Steinberger, who is president of the company, is a member of the Navy Relief Society, a foundation member of the Navy League of the United States and a patron member of the American Red Cross Society. In addition, Mr. Steinberger has been appointed a subpostmaster for the sale of Thrift stamps and has encouraged every one of his 250 employes to buy Thrift stamps, making it an inducement for them to do so by giving them larger denomination stamps when they accumulate a certain number of stamps. His numerous activities furnish ample evidence of Mr. Steinberger's patriotism.

Visitors in Chicago.

L. L. HILL, of the Page & Hill Co., and J. D. MILBURN, Chicago manager, were callers at TELEPHONY's office last week. The Page & Hill Co., which deals in cedar poles, maintains offices at Chicago, Minneapolis, and Houston, Texas. Messrs. Hill and Milburn report a growing demand for cedar products from the telephone industry.

Obituary.

HENRY B. NEWHALL, formerly of New York and Plainfield, N. J., but who during recent years made his home at Littleton, N. H., died on February 16 after a long illness. Mr. Newhall was born in 1846 at Concord, N. H. He came to New York in the early seventies and was for many years well known in the hardware, iron and steel, and machinery lines. He was president of the Newhall Chain Forge & Iron Co., New Jersey Foundry & Machine Co., Diamond Expansion Bolt Co. and Garwood Co.

OUR QUALITY OF SERVICE IS A SERVICE OF QUALITY

UTILITIES

INSURANCE AT COST

UTILITIES LIABILITY AUTOMOBILE SERVICE

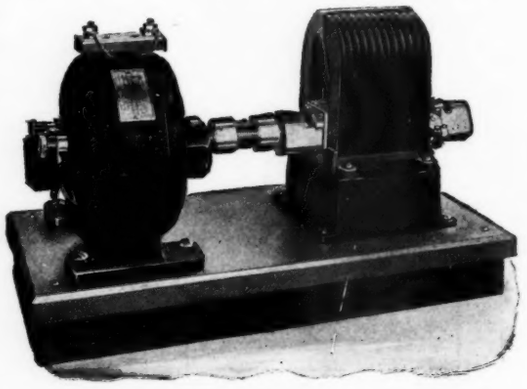
FIRE SERVICE

ADDRESS

UTILITIES INDEMNITY & FIRE EXCHANGES

LYNTON T. BLOCK Atty. & Mgr.
RAILWAY EXCHANGE BUILDING
ST. LOUIS, MO.

USE A HOLTZER-CABOT MAGNETO RINGING MOTOR-GENERATOR TO RING YOUR SUBSCRIBERS AND CUT OUT THE EXPENSIVE BATTERY UPKEEP



Just advise us whether your available power circuit is direct or alternating, what the voltage, phase and cycles are, and we will recommend one of our three sizes for your exchange.

THIS MAGNETO RINGING MOTOR-GENERATOR WILL GIVE YOU A CONTINUOUS RINGING CURRENT, OF THE SAME STRENGTH ALWAYS, which you will find very satisfying.

Write for Bulletin 310T.

The Holtzer-Cabot Electric Company

BOSTON, MASS. and CHICAGO, ILL.

Please tell the Advertiser you saw his Advertisement in TELEPHONY.